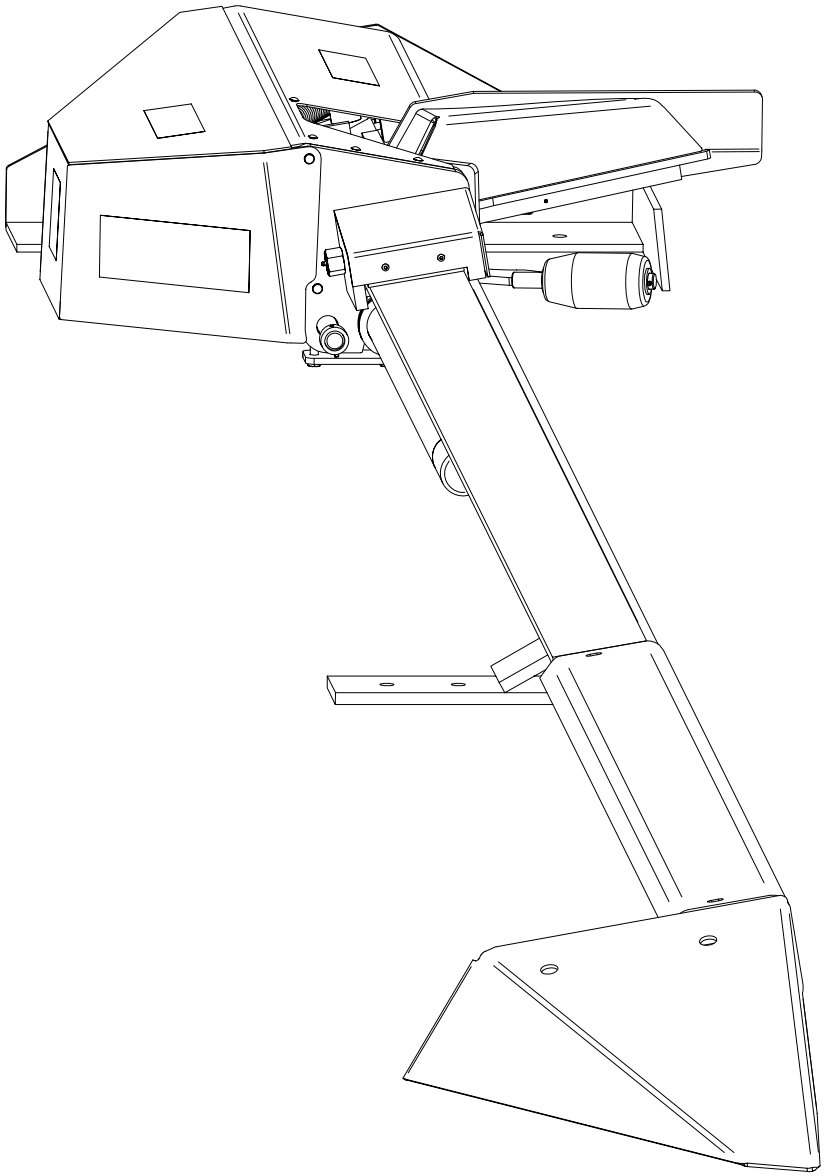
Automatic Wheel Restraint
Surface Mounted



This manual applies to SLSC and Surface Chock wheel restraints manufactured beginning December 2013 with the serial number 61098919 and higher.

⚠WARNING

Do not install, operate or service this product unless you have read and understand the Safety Practices, Warnings, and Installation and Operating Instructions contained in this manual. Failure to do so could result in death or serious injury.

User's Manual
Installation, Operations, Maintenance and Parts

Part No. 6001813Q

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INTRODUCTION

Welcome, and thank you for buying this wheel restraint from 4Front Engineered Solutions, Inc.

This User's Manual contains information that you need to safely install, operate and maintain the wheel restraint. It also contains a complete parts list and information about ordering replacement parts. Please keep and read this User's Manual before using your new wheel restraint.

This manual covers the Serco® SAFETY-CHOCK® and the Kelley® SURFACE CHOCK™ wheel restraints.

SAFETY SIGNAL WORDS

You may find safety signal words such as DANGER, WARNING, CAUTION or NOTICE throughout this User's Manual. Their use is explained below:

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

⚠DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury.

NOTICE

Notice is used to address practices not related to personal injury.

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SAFETY PRACTICES

⚠WARNING

Read these safety practices before installing, operating or servicing the wheel restraint. Failure to follow these safety practices could result in death or serious injury.

READ AND FOLLOW THE OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE WHEEL RESTRAINT. If you do not understand the instructions, ask your supervisor to teach you how to use the wheel restraint.

Improper installation of wheel restraint could result in death or serious injury to dock workers or other users of the wheel restraint.

Vehicles leaving or moving when loading and unloading are in process could result in death or serious injury.

Be certain bystanders in the driveway stand clear when the wheel restraint is operating.

Be certain to follow the installation instructions in this manual.

OPERATION

Use by untrained people can cause property damage, bodily injury and/or death. Your supervisor should teach you the safe and proper way to use the wheel restraint. Read and follow the complete OPERATING INSTRUCTIONS on page 14 before use. Do not use the wheel restraint if it is not working right. Tell your supervisor it needs repair.

Do not operate the wheel restraint with equipment, material, or people directly in front of the restraint.

Do not use the wheel restraint if it looks broken or does not seem to work right. Tell your supervisor at once.

Keep hands and feet clear of the restraint mechanisms at all times. Stay clear of the wheel restraint when it is moving.

Before chocking vehicle wheel or engaging the wheel restraint, dump air from air ride suspensions and set parking brake.

Prior to using the wheel restraint:

- Ensure the path of the sensing roller is free and clear of all debris, ice and snow.
- Ensure the freight carrier is parked firmly against the dock bumpers.

OPERATION (continued)

After engaging the wheel restraint:

- Load or unload the transport vehicle only when the inside GREEN light is displayed.
- If the wheel restraint cannot make engagement, use wheel chocks to secure the transport vehicle, then turn selector switch to **RESTRAINT OVERRIDE/LIGHTS ONLY**.

Pressing the **STOP** button at any time will stop movement of the chock.

INSTALLATION, MAINTENANCE AND SERVICE

Before doing maintenance or service be certain that the power is disconnected and properly tagged or locked out. Failure to follow these safety practices may result in death or serious injury.

If the wheel restraint does not operate properly using the procedures in this manual, BE CERTAIN TO MANUALLY CHOCK THE VEHICLE WHEELS BEFORE LOADING OR UNLOADING. Call your local distributor for service.

Place barricades around pit on dock floor and drive while installing, maintaining or repairing the wheel restraint.

Do not stand in the driveway between the dock and a backing vehicle.

All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes.

Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off.

Before doing any welding, make certain the power is disconnected and properly tagged or locked off.

If it is necessary to make troubleshooting checks inside the control box with power on, USE EXTREME CAUTION. Do not place fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, serious injury or death.

Pressing the **STOP** button at any time will stop movement of the chock.

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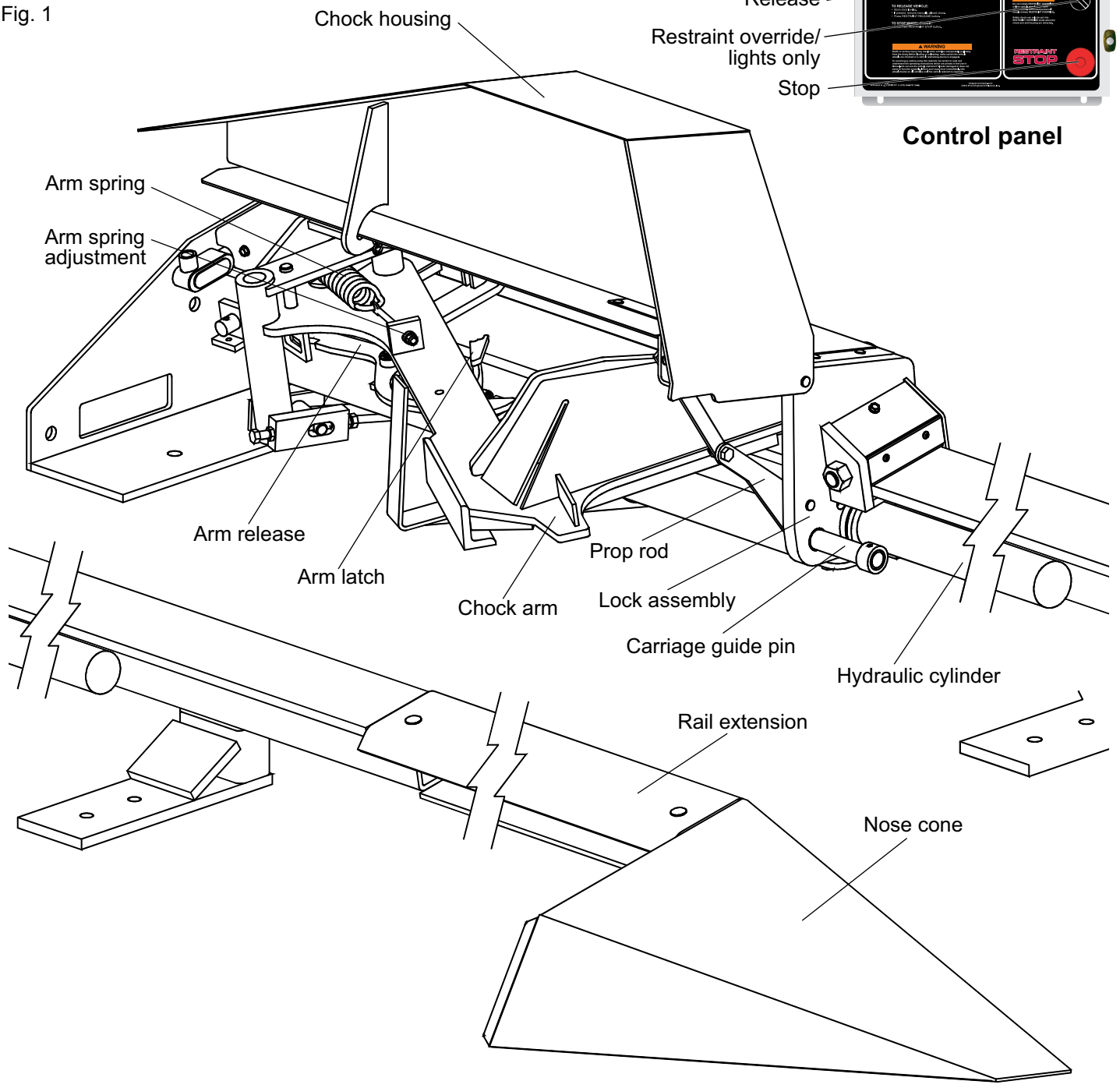
COMPONENTS AND SPECIFICATIONS

The main components of the wheel restraint are shown below. See the Parts List for specific part numbers.

Fig. 2

Control panel

Fig. 1



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COMPONENTS AND SPECIFICATIONS, continued

Control Panel - NEMA 12, Solid state PLC (Programmable Logic Controller), U.L. approved panel and components, automatic motor starter, thermal overload, resettable control circuit breaker.

Proximity Sensors - NEMA 6P, normally open, with LED pilot light.

Pressure Switch - Adjustable, factory set to 450 PSI.

Motor - NEMA Standard T.E.N.V. / 56C frame, 1 HP (.75 kW), single or three phase.

Solenoid Valves - (1) Normally open poppet, (1) Normally closed poppet, 125V, continuous duty, 0.5 amp.

Pump - Single stage gear pump, 2.7 GPM (10.2 LPM), primary relief valve factory set at 800 PSI.

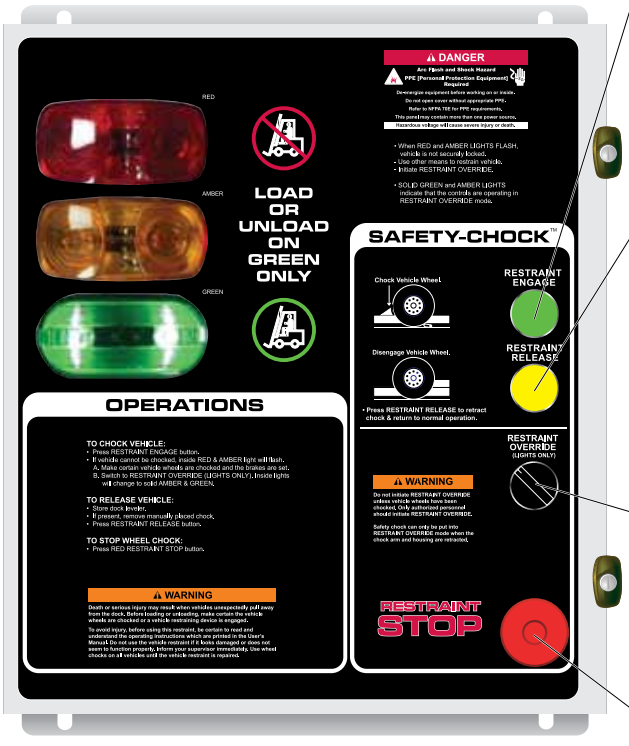
Reservoir Capacity - 2.7 Gallons (10.2 Liters).

Hydraulic Fluid - An all weather hydraulic fluid with a viscosity of 15 cSt at 40ºC (100ºF), such as Shell Tellus T 15, Mobil Aero HFA (49011), Exxon Univis Grade J13, Texaco Aircraft Oil #1554, U.S. Oil Co., Inc. #ZFI-5606 (Low Temp).

ELECTRICAL SYSTEM OPERATION

The following describes the operation of the Electrical System when the controls are activated:

Fig. 3



ENGAGE

Press in

- Motor starts and hydraulic cylinder extends.
- Sensing roller engages rear vehicle wheel.
- Pressure switch trips.
- Chock arm extends.
- Hydraulic cylinder retracts.
- Chock engages wheel and motor stops.
- Motion alarm sounds.

RELEASE

Press in

- Motor starts and hydraulic cylinder extends.
- Sensing roller engages rear vehicle wheel.
- Pressure switch trips.
- Hydraulic cylinder and chock arm retract.
- Chock housing returns to the stored position and motor stops.
- Returns system from lights only (**RESTRAINT OVERRIDE/LIGHTS ONLY**) to normal operating condition.
- Motion alarm sounds.

RESTRAINT OVERRIDE/LIGHTS ONLY

Turn clockwise (spring return)

- Turn selector to right and release.
- Power is cut off from motor control circuit.
- Power is supplied to outside RED light and inside GREEN and AMBER lights.

RESTRAINT STOP

Press in

- Power is cut off from motor control circuit.
- Pull out to resume normal operations.

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INSTALLATION INSTRUCTIONS

⚠WARNING

Before installation read and follow the Safety Practices on page 3. Failure to follow these safety practices could result in death or serious injury.

READ AND FOLLOW THE OPERATION INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE WHEEL RESTRAINT. If you do not understand the instructions, ask your supervisor to teach you how to use the wheel restraint.

Improper installation of the wheel restraint could result in death or serious injury to dock workers or other users of the wheel restraint.

Place barricades around pit on dock floor and drive while installing, maintaining or repairing the wheel restraint.

Be certain bystanders in the driveway stand clear when the wheel restraint is operated.

Be certain to follow the installation instructions in this manual.

INSTALLATION INSTRUCTIONS

1. Layout the installation position. Refer to the wheel restraint installation drawings included in this publication for clarification of the following instructions. See Fig. 4.

NOTE:

For units with remote roller guard, refer to the formal approval drawing specific to the site.

a. Mark the center line of the dock on the driveway. This is point “A”.

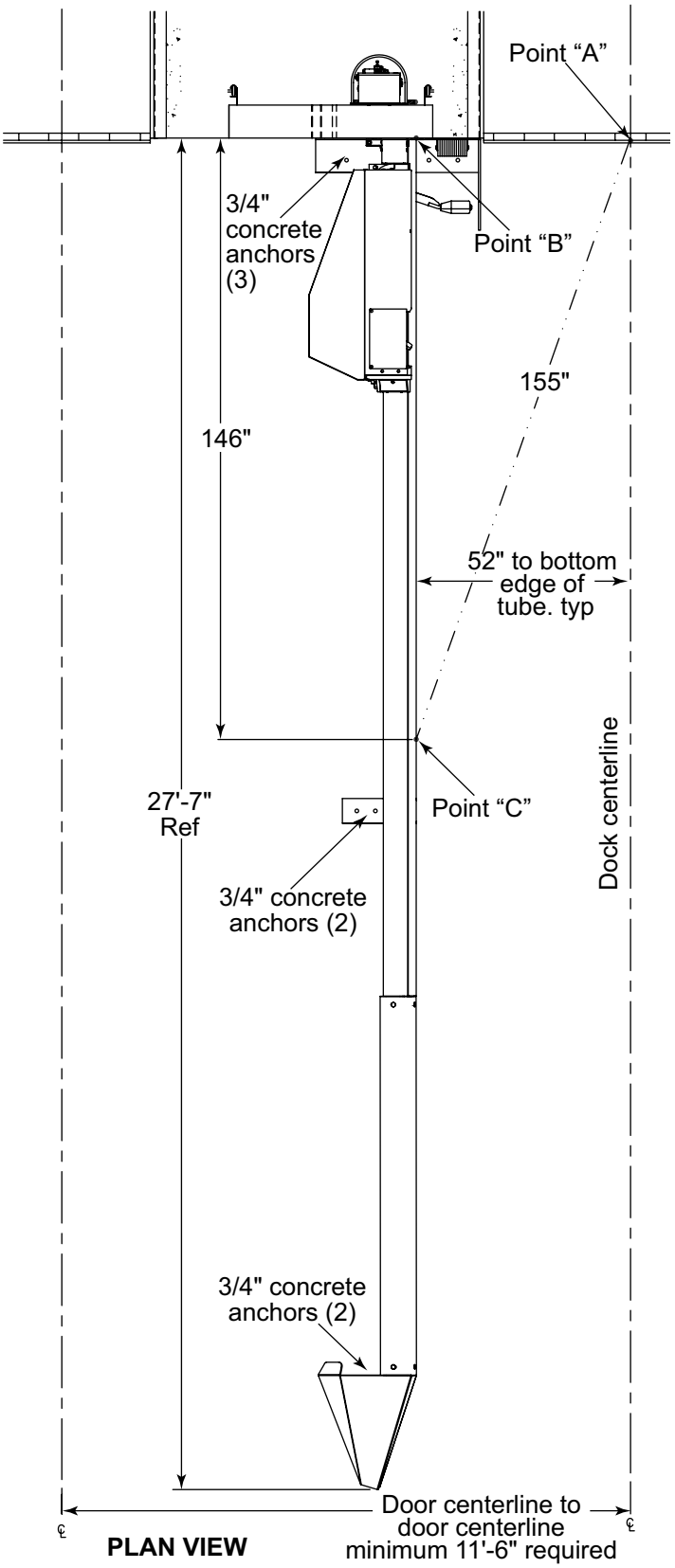
b. While facing the dock, measure over 52" to the left of the center line and mark the driveway at the dock wall. This is point “B”.

c. Measure 146" out from the dock wall (from point “B”) and draw a line on the driveway parallel to the wall.

d. Hold one end of the tape measure on the center line of the dock wall (point “A”) and measure out 155" to the 146" line. Mark where the 155" distance crosses the 146" line. This is point “C”.

e. Mark a line from point “B” to point “C” and extend the line out 26' from the dock face. This line will be square to the dock wall.

Fig. 4



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2. Position the wheel restraint assembly against the wall and on the left side of the driveway with the inside edge of the guide rail tube directly above the line “B-C”. Secure the rail assembly to the driveway with five anchor bolts 3/4" diameter by 5-1/2" long (Furnished by 4Front Engineered Solutions, Inc.). Do not anchor bolt to the building wall. Torque to 110 ft. lbs.

3. Mount the optional remote roller guard and spacer. Secure the remote roller guard and spacer with 3/4" x 5-1/2" long anchor bolts. See Fig. 5.

4. Using the carriage bolts supplied, attach the rail extension to the front of the rail and to the nose cone. Do not tighten the bolts. Line up the rail extension with the line “B-C”.

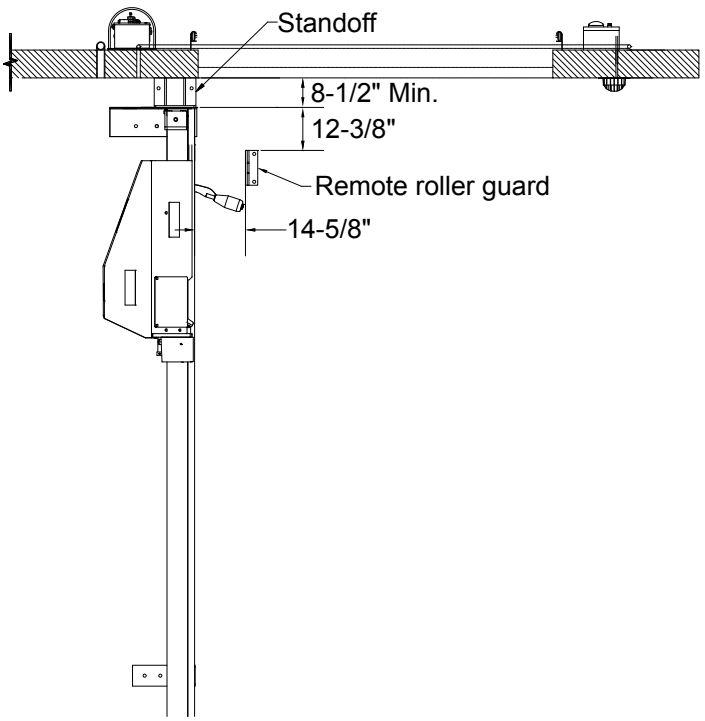
5. Remove the covers from the nose cone and mark the location of the two mounting holes on the pavement. Remove the nose cone and drill the holes for the anchor bolts.

6. Secure the nose cone to the driveway with two anchor bolts 3/4" diameter by 5-1/2" long. Tighten the rail extension bolts and replace the covers on the nose cone.

7. Mount the hydraulic power unit inside the building near the end of the rail assembly. Install a 2-1/2" diameter duct for hydraulic hoses from the power unit to the wheel restraint. Install conduits for electric wires if required by local codes. (The wires are for the 24 VDC proximity switches, and for the optional 120 VAC heater.)

8. Mount the control panel on drivers side of the dock so that the communication lights are visible to the fork truck driver. Mount the outside communication lights and sign so that they are visible to the vehicle driver. Mount the motion alarm on the same side as the restraint using the provided mounting bracket. Refer to the installation drawing for recommended dimensions. Make sure the RED light is on top and the GREEN light on the bottom when the light assembly is mounted. See Fig. 6.

Fig. 5



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⚠WARNING

The chock motion alarm assembly must be located in the area of the chock on the outside wall. A bracket is provided for outside wall mounting. Failure to mount the alarm outside in close proximity with the chock may reduce its effectiveness which could result in death or serious injury. The motion alarm assembly is designed and controlled to sound whenever the chock is in motion.

⚠WARNING

All wiring must be done by a qualified technician and must meet all applicable codes.

10. Make all connections as shown on electrical installation drawings, see pages 27-30 and 36-38. This includes power into the control panel from a fused disconnect, wiring from panel to motor, hydraulic power unit, outside lights, outside motion alarm, solenoid valve, pressure and proximity switches, and options such as trailer presence indicator and heat tape. This would also include any interlocking between components such as to a vertically storing dock leveler.

11. Attach the ends of the two supplied hydraulic hoses to the power unit fittings as shown on page 44 of this manual. Seal the unattached ends with tape so dirt and foreign material cannot enter the hoses. Route the hoses through the 2-1/2" duct to the outside and connect the free ends of the hoses together. Do not connect the hoses to the hydraulic cylinder at this time.

NOTE:

Do not connect the hoses to the hydraulic cylinder until all air has been bled. Air in the hydraulic system will cause jerky operation requiring the system to be bled. Use bleed procedure shown on page 18.

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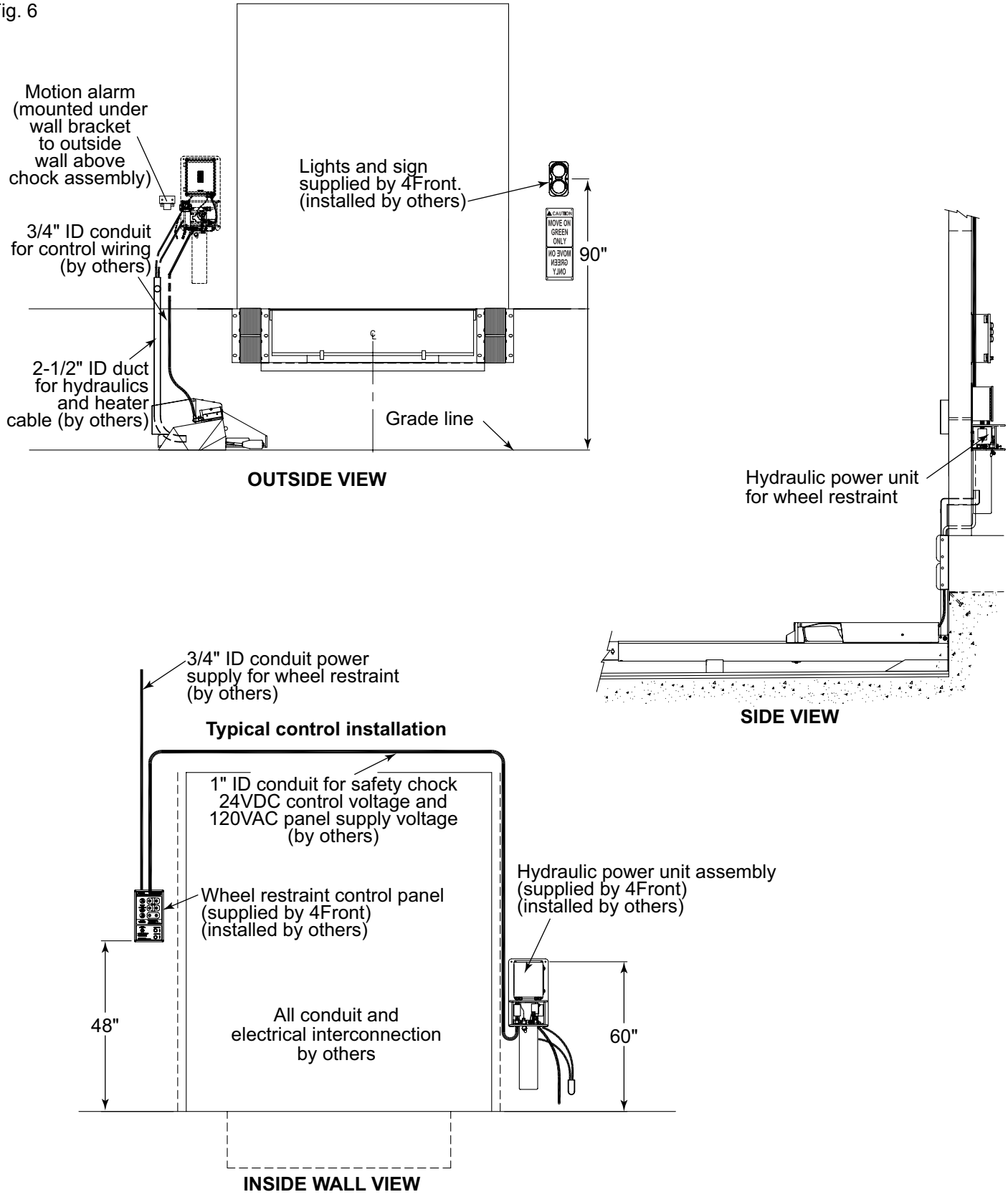
Fig. 6


Motion alarm (mounted under wall bracket to outside wall above chock assembly)
Lights and sign supplied by 4Front. (installed by others)
3/4" ID conduit for control wiring (by others)
90"
2-1/2" ID duct for hydraulics and heater cable (by others)
Grade line
OUTSIDE VIEW
Hydraulic power unit for wheel restraint
SIDE VIEW
3/4" ID conduit power supply for wheel restraint (by others)
Typical control installation
1" ID conduit for safety chock 24VDC control voltage and 120VAC panel supply voltage (by others)
Hydraulic power unit assembly (supplied by 4Front) (installed by others)
Wheel restraint control panel (supplied by 4Front) (installed by others)
48"
All conduit and electrical interconnection by others
60"
INSIDE WALL VIEW

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12. Obtain the adjustment bolts from the shipping tube for the sensor roller arm and install the roller arm on the pivot pin. See Fig. 7. Adjust the sensor arm to 32". See page 31. When adjustment is complete, secure the position of the adjusting bolts with jam nuts. Do not overtighten the adjusting bolts.

⚠WARNING

Before installation read and follow the Safety Practices on page 3. Failure to follow these safety practices could result in death or serious injury.

⚠DANGER

Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off. All electrical work must be done by a qualified technician and meet all applicable codes. If it is necessary to make troubleshooting checks inside the control box with the power on, USE EXTREME CAUTION. Do not place your fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, death or serious injury.

WHEEL RESTRAINT — STARTUP INSTRUCTIONS

1. Refer to the manual for operation instructions and location of components in the control panel. Remove the 3/8 NPT plug from the hydraulic reservoir and install the breather cap.

2. Turn on the electrical power to the wheel restraint. Open the control panel and locate the LED indicators for the Inputs and Outputs. Input 0 should be on. If not, ensure the circuit breaker is on and check wiring to the pressure switch. (Pressure switch NC [normally closed] contacts are used).

3. Because the proximity switch inputs 1 and 2 are not on, the control will be in “Jog Mode” and the inside AMBER light will flash. The operator will be able to manually control the motor using the **ENGAGE** and **RELEASE** buttons in “Jog Mode”. See “Jog Mode” instructions on page 16.

4. Press the **ENGAGE** button and hold it for no more than 10 seconds. Input 3 LED should go off and the gauge should indicate pressure from the pump. If there is no indication of pressure and the electrical power is three phase, reverse the wires to terminals TI and T2. Repeat step 4.

5. Press the **RELEASE** button and hold it for at least 15 seconds to run the pump and force the air out of the hoses. Then turn off electrical power to the panel.

6. Place a container under the hydraulic cylinder ports to catch any fluid which may leak from the hoses during step 7. Refer to the hydraulic installation drawing to identify the “E” and “R” ports of the cylinder.

7. Disconnect the hoses from each other and attach the hoses to the hydraulic cylinder. Try to minimize fluid loss and air entry, while connecting the hoses.

8. Check that the hydraulic fluid is showing on the breather dip stick in the reservoir. Add fluid if required.

NOTE:

An assistant is required for the following operations. Refer to the Test Drawing on page 11 for clarification of instructions.

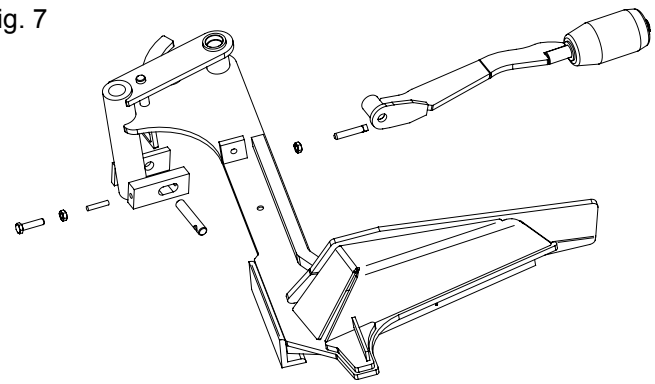
⚠WARNING

Keep hands and feet away from the pinch points at the ends of the test bar when chock is moving. Keep away from the path of the chock arm when using the test bar.

9. Select a piece of lumber stock (or other suitable bar) about 6' long. This “test bar” will be used to simulate contact with a wheel during the startup procedure. Place one end of the test bar against the back of the front mounting post of the guide rail and the other end in the path of the washer on the sensing roller. Refer to Fig. 8.

10. Ensure driveway is clear before operating the wheel restraint. Then turn on the electrical power to the wheel restraint.

Fig. 7



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⚠CAUTION

Chock arm will swing out of housing when test bar contacts roller arm. Keep clear.

11. Turn and hold the selector switch on the control panel to the **RESTRAINT OVERRIDE/LIGHTS ONLY** position. Press and hold the **ENGAGE** button to extend the chock housing away from the dock. The inside RED light should be flashing to indicate “Jog Mode”. Continue holding the button until the sensing roller contacts the rear end of the test bar and the chock arm extends fully. Then press the **RELEASE** button to retract the chock housing and release the test bar.

12. Referring to page 31, adjust the bolts for the sensor roller arm until the front of the roller is 32" from the surface of the chock as shown. Tighten the adjustment bolts gently, only enough to hold the pin in place, and then tighten the jam nuts securely. DO NOT overtighten the adjustment bolts.

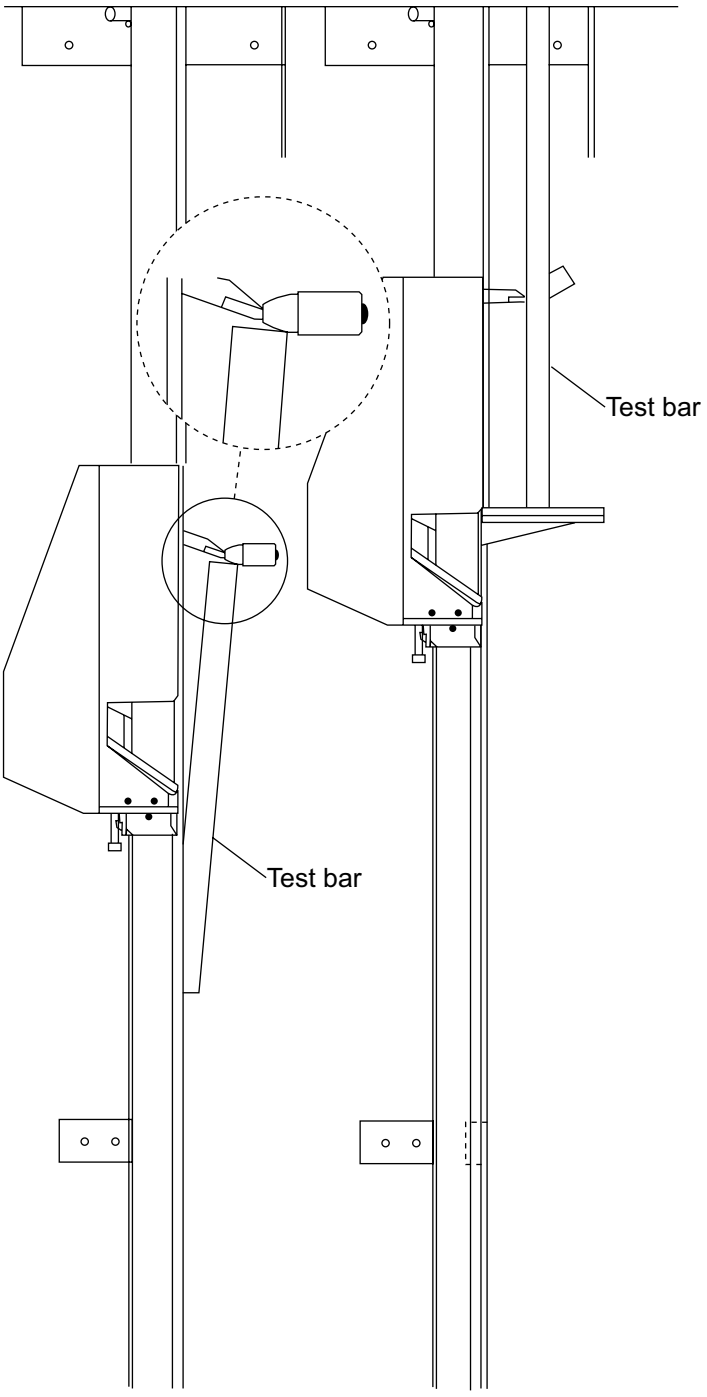
13. Turn the selector switch clockwise and hold it in the **RESTRAINT OVERRIDE/LIGHTS ONLY** position. Press and hold the **RELEASE** button to bring chock assembly toward the wall, Have the assistant hold the test bar with the rear end against the dock wall so the chock will contact the front of the test bar and the chock will be locked in position. See Fig. 8.

14. While holding the selector switch in the **RESTRAINT OVERRIDE/LIGHTS ONLY** position, press and hold the **ENGAGE** button to free the test bar. Then press and hold the **RELEASE** button. The chock arm should retract into the housing. If it does not, then place the test bar against the back of the mounting post of the guided rail as described on step 9 so it will be in the path of the sensing roller. Then extend the chock assembly until it is stopped by the sensing roller against the end of the test bar. See Fig. 8.

15. While holding the selector switch in the **RESTRAINT OVERRIDE/LIGHTS ONLY** position, press and hold the **RELEASE** button and the chock arm will retract into the housing. Continue holding the **RELEASE** button until the chock assembly is in the stored position against the wall.

16. When the wheel restraint is in the stored position against the dock wall, the AMBER lamp will continue to flash if an error code has been set (automatic jog mode). Press the **RELEASE** push-button to clear this condition and return to normal operation.

Fig. 8



⚠CAUTION

Chock arm will swing out of housing when test bar contacts roller arm. Keep clear.

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INSTALLATION INSTRUCTIONS, continued

17. To verify automatic operation of the wheel restraint,
    a. Place the test bar against the back of the front mounting post of the guided rail so it will be in the path of the sensing roller.

    b. Press the **ENGAGE** button. The chock assembly will travel outward on the rail until the sensing roller contacts the rear of the test bar and the chock arm is fully extended. The housing will then reverse.

    c. Have the assistant hold the test bar with the rear end against the dock wall so the chock will contact the front of the test bar. When the chock contacts the end of the test bar, the power unit will stop and the test bar will be locked against the wall.

    d. Press the **RELEASE** button. The chock assembly will travel outward on the rail for several seconds and will then reverse. The chock arm should retract. The chock housing will continue to reverse until it stops against the dock wall. If the chock arm does not retract, block sensor arm rollers forward motion until carriage (item 1) and lock (item 2) separate.

18. Refer to the operation and maintenance instructions. If the wheel restraint does not operate properly, refer to the troubleshooting guide on pages 19-21.

TRAILER PRESENCE SENSOR (OPTIONAL)

The trailer present sensor senses a vehicle at the dock and transmits a signal to the control panel. This turns on the panel face AMBER light. Mount the sensor. See Fig. 9. Ensure the sensor's logic switch is set to L/O (Light Operate). The switch is located on the top of the sensor under a plastic cover. Wire the switch. Wire the sensor into the panel per the per the job specific schematic located in the panel. Test for proper operation as per below.

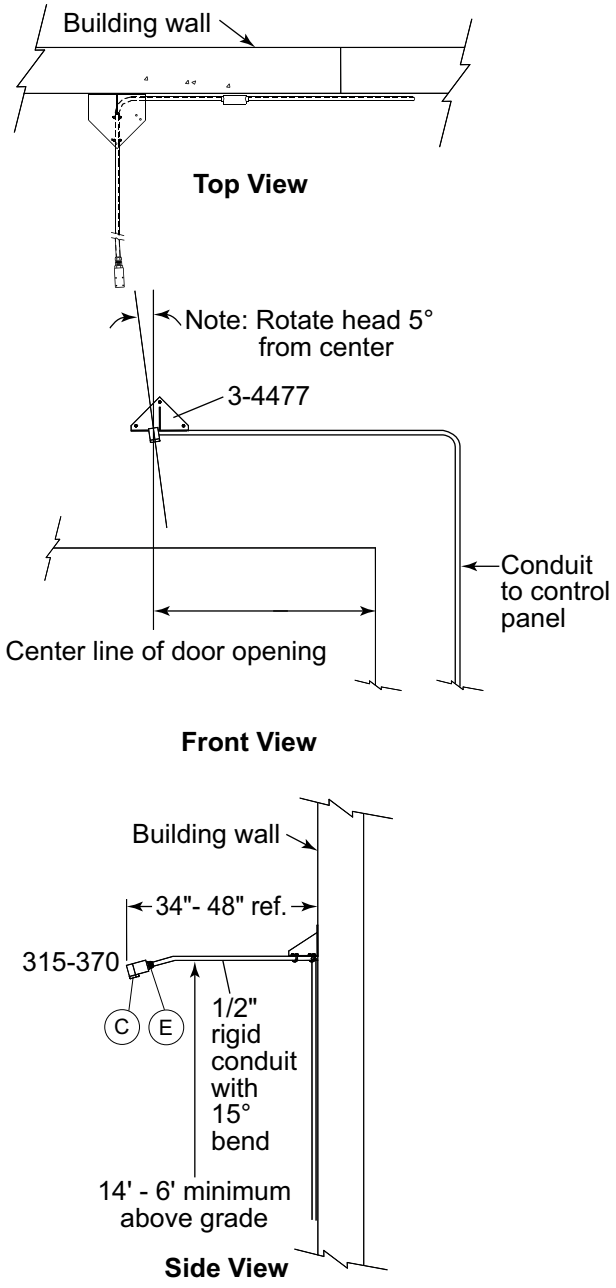
1. For vehicle presence sensor installed termination, see schematic included in panel.
    a. The sensor is a 4 wire device. First terminate the positive lead (brown wire) to any "C" terminal on the input board.

    b. Terminate the negative lead (blue wire) to any "0V" terminal in the panel.

    c. Terminate the load lead (black wire) to the terminal specified in the job specific wiring schematic.

    d. Tape (insulate) the unused white wire.

Fig. 9



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OPERATIONS

No Trailer Present

- Inside lights display Solid RED outside display GREEN.

Trailer Arrives

- Inside lights switch to Solid AMBER and RED, outside lights continue to display GREEN.

Operator engages vehicle restraint

- Inside lights switch to Solid GREEN, outside lights switch to display RED.

Operator releases vehicle restraint

- Inside lights switch to Solid AMBER and RED, outside lights continue to display GREEN.

Trailer Departs

- Inside lights display Solid RED outside display GREEN.

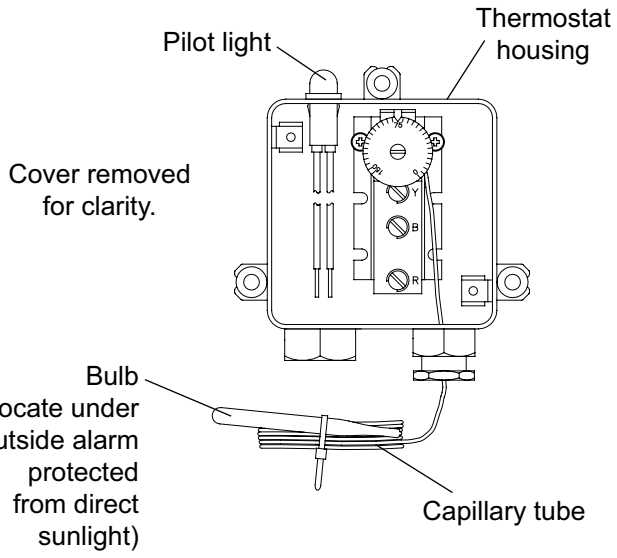
HEATER (OPTIONAL)

1. On the inside of the wall, mount the thermostat housing on the chock side of the door opening and in close proximity to the outside alarm. Protrude the bulb through the wall and under the outside alarm to protect the bulb from direct sunlight.

2. Wire the heating element into the thermostat housing. Power for the heating element is to be wired from the control panel to a circuit breaker and GFI protection in the power unit junction box, then to the thermostat housing and then to the heating element as shown in the power unit junction box wiring diagrams on pages 37-38.

3. Set the thermostat 10°F lower than the current outside temperature. Test the heating element and chock for proper operation. Reset the thermostat to 40°F or desired activation temperature.

Fig. 10



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OPERATING INSTRUCTIONS

Use these instructions for normal operations.

⚠WARNING

Before operating the wheel restraint, read and follow the Safety Practices, Warnings, and Operation instructions contained in this manual. Use by untrained people could result in death or serious injury.

Do not use the wheel restraint if it looks broken or does not seem to work right. Tell your supervisor at once.

Keep hands and feet clear at all times. Stay clear of the wheel restraint when it is moving.

Do not load or unload any vehicle unless you make certain the wheel restraint has securely engaged the tire and set the brakes. If the wheel restraint does not chock the vehicle's tire for any reason, BE CERTAIN TO MANUALLY CHOCK THE VEHICLE WHEELS BEFORE LOADING OR UNLOADING.

Enter the vehicle only when the GREEN signal light on the control panel is on. You must check the GREEN signal light each time that the vehicle is entered. If the GREEN light goes off at any time during loading operations, immediately cease loading operations and check the wheel restraint to ensure that it is securely hitched.

If the power to the wheel restraint is interrupted, immediately cease operations and check the unit. Consult the troubleshooting instructions to reset the lights when power resumes.

Vehicles leaving or moving when loading and unloading are in process could result in death or serious injury.

Failure to follow these safety practices may result in death or serious injury.

Pressing the STOP button at any time will stop movement of the chock.

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ENGAGING VEHICLE

1. When the wheel restraint is stored, the outside GREEN light and inside RED light will be on.

2. To secure the vehicle at the dock, press the **ENGAGE** button. The outside lights immediately change from GREEN to RED, and the chock housing will start to move away from the wall. The chock housing will continue moving outward until the sensing roller contacts the rear wheel of the vehicle.

3. When the sensing roller contacts the rear wheel of the vehicle the chock arm will extend out of the housing until it is placed in front of the rear wheel. When the chock is fully extended, the chock housing will reverse and move the wheel chock back to firmly engage the wheel. The inside lights will change from RED to GREEN. The vehicle is now safe to load or unload.

⚠WARNING

When the wheel restraint has engaged a wheel, the hydraulic pump will automatically start and maintain engagement pressure against the wheel if the vehicle moves. Disconnect power to the control panel or turn the circuit breaker to OFF before attempting to make adjustments. Failure to keep clear may result in personal injury.

Fig. 11

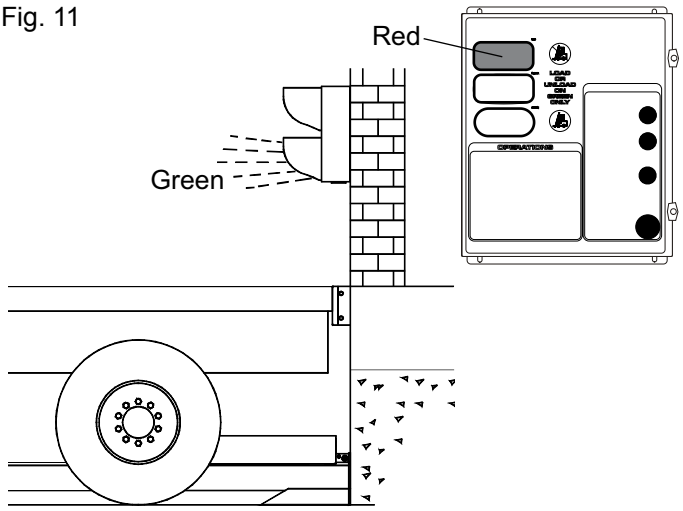


Fig. 12

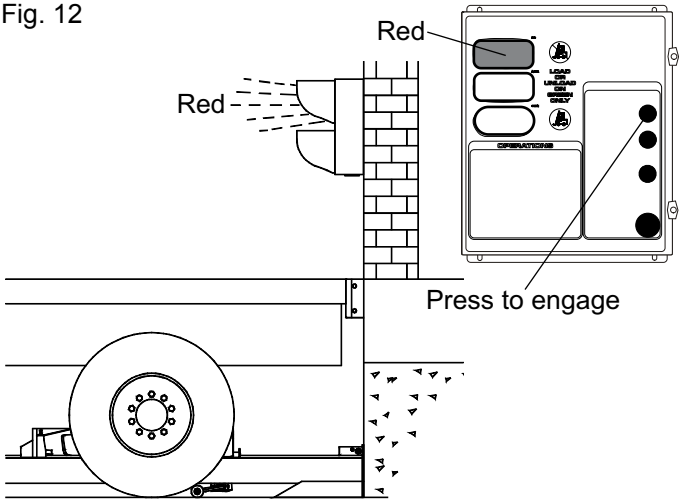
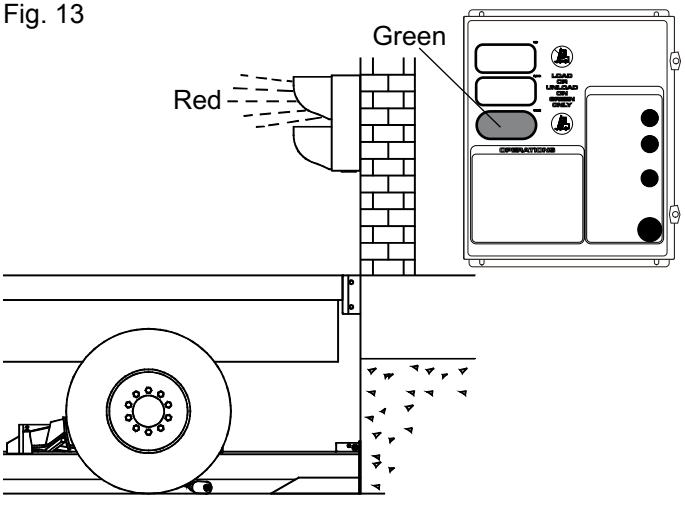


Fig. 13



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OPERATING INSTRUCTIONS, continued

RELEASING VEHICLE

4. To release the vehicle from the dock, press the **RELEASE** button. The inside lights immediately change from GREEN to RED and the chock housing will begin to move forward. When the chock is clear of the wheel, the housing will reverse, the chock arm will retract into the housing and continue to move toward the wall.

5. When the housing has moved back to the wall, the outside lights will change from RED to GREEN. The vehicle is now free to leave.

FOR VEHICLES WHICH CANNOT BE ENGAGED

If the configuration of the vehicle wheels prevents proper engagement of the wheel chock, the carriage may return to the home position and report a **Vehicle Not Found** condition. This condition is reported by flashing the inside RED and AMBER lamps. Manually chock the vehicle wheels and then rotate the **RESTRAINT OVERRIDE/LIGHTS ONLY** selector switch to initiate a lights override condition. The outside RED lamp and inside GREEN and AMBER lamps will illuminate. The vehicle is now safe to load/unload. When loading/unloading is complete, remove wheel chocks and press **RELEASE.** The outside GREEN lamp and inside RED lamp will illuminate.

Fig. 14

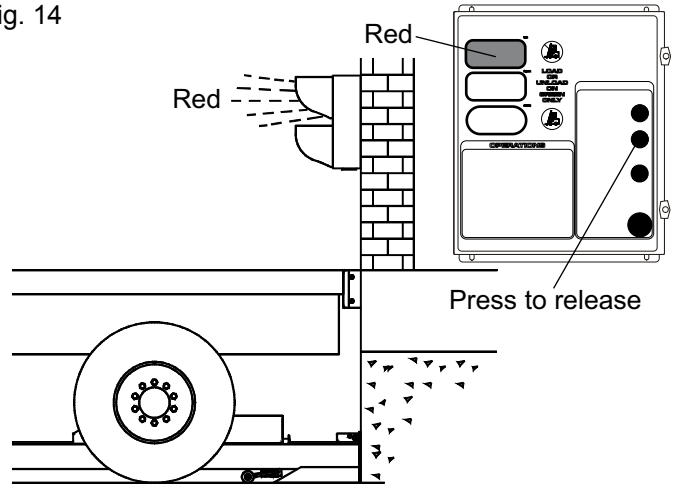


Fig. 15

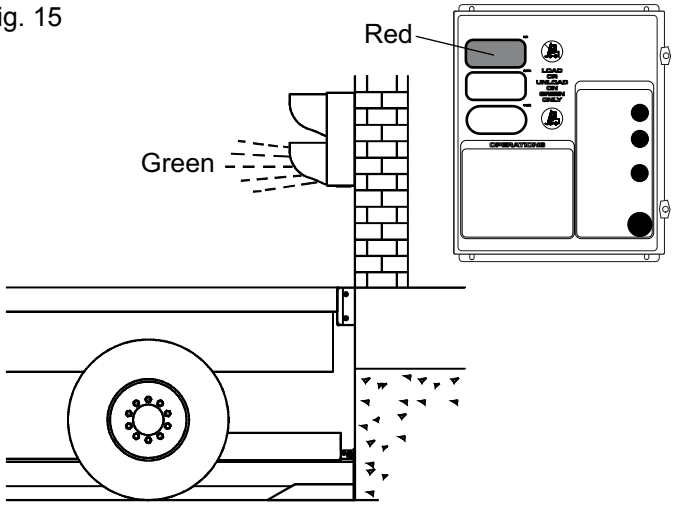
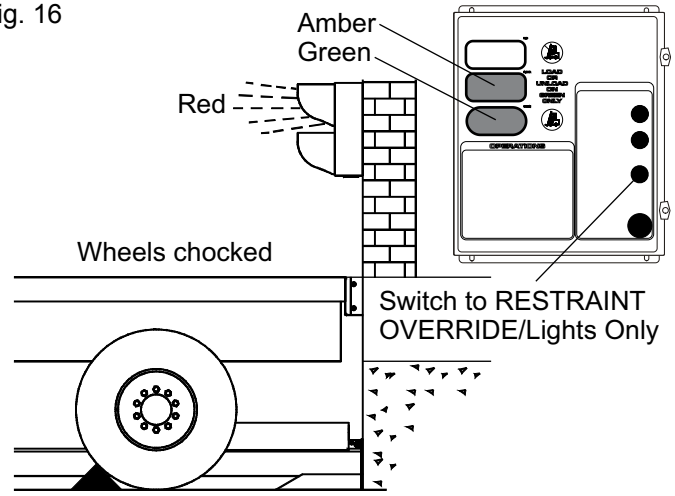


Fig. 16



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MANUAL OPERATION USING "JOG MODE"

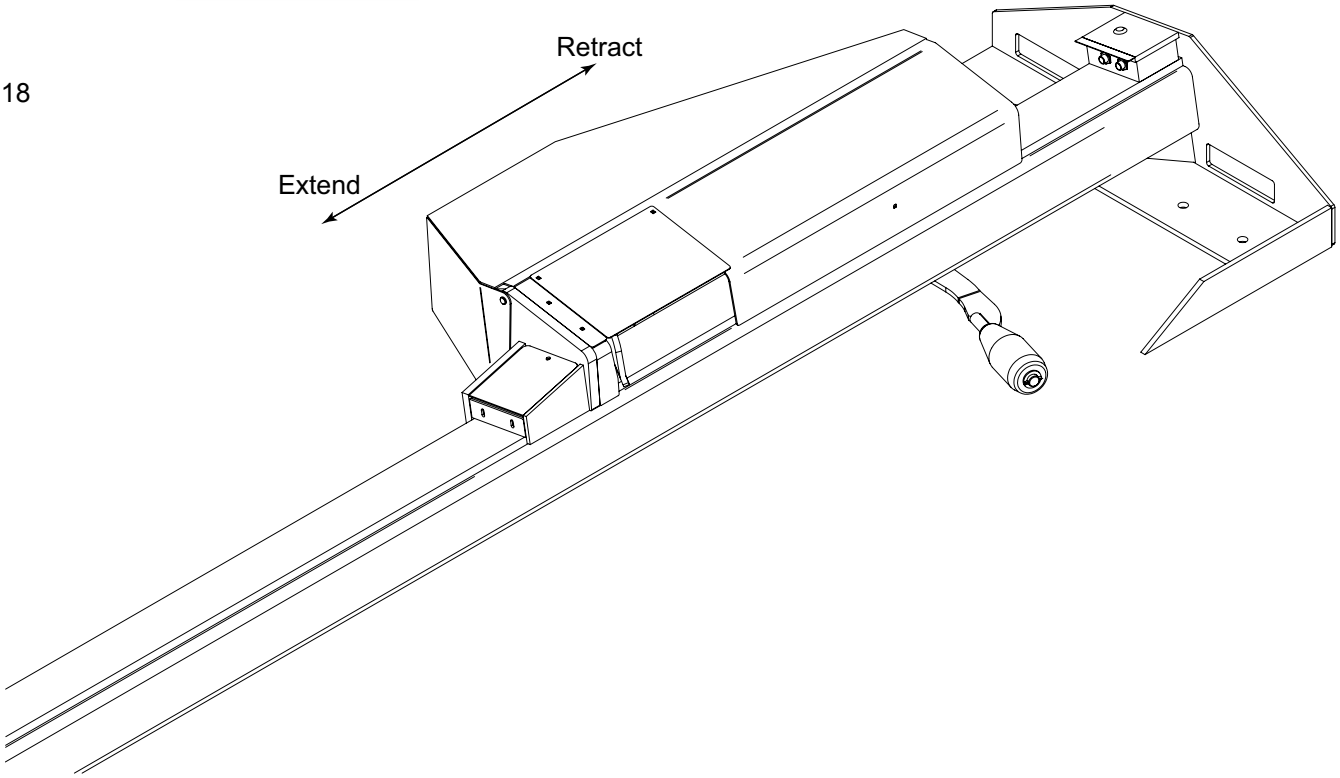
This feature will allow the wheel restraint to be operated manually using the **ENGAGE** and **RELEASE** push-buttons to accommodate the return of the wheel restraint to its home position in the event of a wheel restraint failure. This mode will be entered automatically when the wheel restraint fault has occurred and will exit when all faults have been cleared, the wheel restraint has been returned to its home position and the **RELEASE** push-button has been pressed. To aid in troubleshooting efforts, the wheel restraint may be intentionally put into "Jog Mode". To manually initiate the "Jog Mode", turn and hold the **Restraint Override/Lights Only** switch and press either the **Engage** or **Release** push-buttons to extend or retract the carriage respectively. See the control specification for details regarding panel lamp status.

⚠WARNING

Keep hands and feet away from the wheel restraint when in "Jog Mode". Disconnect power to the control panel or turn the circuit breaker to OFF before attempting to remove an obstruction or to make adjustments. Failure to obey this warning may result in death or serious injury.

Fig. 17

Fig. 18



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PLANNED MAINTENANCE

To ensure the continued proper operation of your wheel restraint, perform the following planned maintenance procedures.

⚠WARNING

Do not service this product unless you have read and followed the Safety Practices, Warnings and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.

DAILY

1. Clear all debris (dirt, snow, etc.) from the path of the sensing roller.
2. Check for worn, torn, or missing dock bumpers. Replace if necessary.
3. Check that all lights on the control panel and both outside lights and alarm are functioning.

WEEKLY

1. Remove all debris from the chock parking area and under the wheel restraint housing.

QUARTERLY

1. Check the level of fluid in the hydraulic reservoir. Oil level shall be within 3-1/2 inches of the fill port with restraint in stored position.
2. Lubricate the arm latch and arm release bearings and the mating faces of arm latch and arm release with light oil. Ensure that they pivot freely. See Fig. 19.
3. Inspect the mechanism for any signs of wear, distortion, or cracked welds.
4. Check all decals and outside sign. Replace as needed.

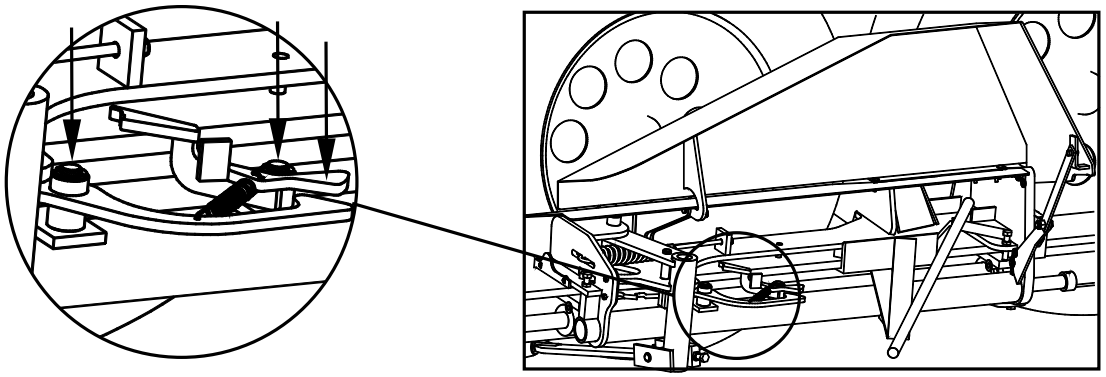
ANNUALLY

1. Check for proper operation of the heat tape (when installed) yearly before the cold weather.

SLSC HYDRAULIC CYLINDER — FILLING AND BLEEDING

1. Verify that the reservoir fluid level is within 3-1/2 inches of the fill port with the restraint in the **STORED** position, against the wall.
2. For all of the operations described below, run the pump in “Jog Mode”. Turn the **RESTRAINT OVERRIDE** selector switch clockwise and hold it. Then press the **ENGAGE** button to extend the cylinder or press the **RELEASE** button to retract the cylinder.
3. Extend the cylinder 4 to 6". Rotate the cylinder to place the bleed screw facing up in an accessible position. It may be necessary to loosen the cylinder support (see items 29 and 43 on page 40).
4. Using a 5/32" hex key, loosen the bleed screw two full turns.
5. With a drip pan under the bleed screw, retract the cylinder until clear fluid starts to flow from the bleed screw.
6. Refill the reservoir with fluid (see quarterly step 1).
7. Fully extend the cylinder while holding the drip pan under the bleed screw.
8. Tighten the bleed screw, then wipe fluid from all surfaces.
9. Retract the cylinder and watch for any fluid leaking from the bleed screw.

Fig. 19



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EMERGENCY RELEASE PROCEDURE

If the wheel restraint does not automatically release the vehicle wheel, the chock can be retracted manually by moving the lock assembly away from the carriage assembly. Depending on the cause of the problem, use one of the following methods.

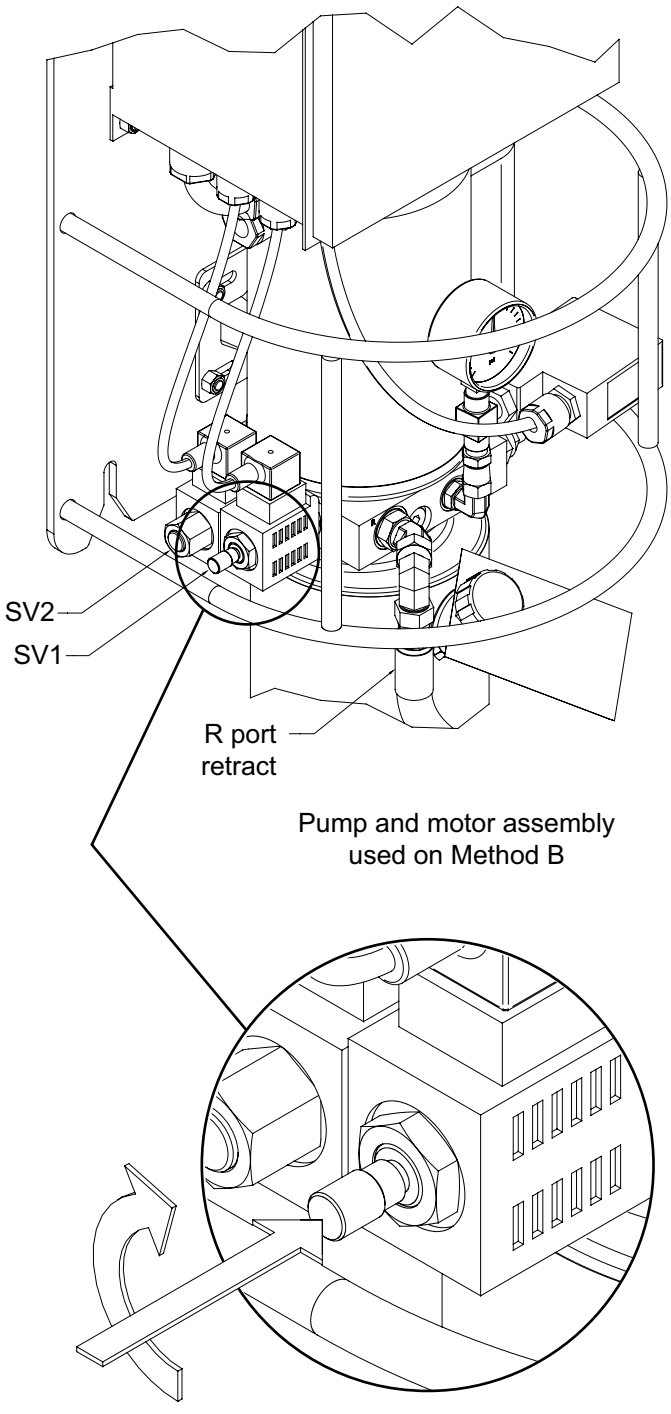
METHOD A — OPERATE WHEEL RESTRAINT IN "JOG MODE"

1. Rotate and hold the **RESTRAINT OVERRIDE/LIGHTS ONLY** switch.
2. The inside lights will change to solid AMBER and solid GREEN.
3. Press the **ENGAGE** button to move the lock assembly forward. If the motor will not run or the lock assembly will not move, go to Method B.
4. After the chock has stopped moving forward, press the **RELEASE** button to retract the lock assembly, and the chock arm should also retract.
5. If the chock still does not retract, go to Method B.
6. Hold the **RELEASE** button until the chock returns to the stored position.
7. Press the **RELEASE** button once to return to normal mode with a constant RED light.

NOTE:

To manually release the restraint, push button in, twist counterclockwise and release. In this position the valve will remain open. **To return to normal operation**, push button in, twist clockwise and release (see diagram).

Fig. 20



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EMERGENCY RELEASE PROCEDURE, continued

METHOD B —
MANUALLY RELEASE THE HYDRAULIC PRESSURE
(no electric power at dock)

1. Turn circuit breaker **OFF** inside control panel.

2. Open the **MANUAL RELEASE** knob on the hydraulic solenoid valve SV1. This will open the valve, release pressure and allow fluid to escape from the hydraulic cylinder. See Fig. 20.

3. Raise the cover of the wheel restraint. Place a pry bar between the release plates on the chock arm and lock assembly as shown in Fig. 21.

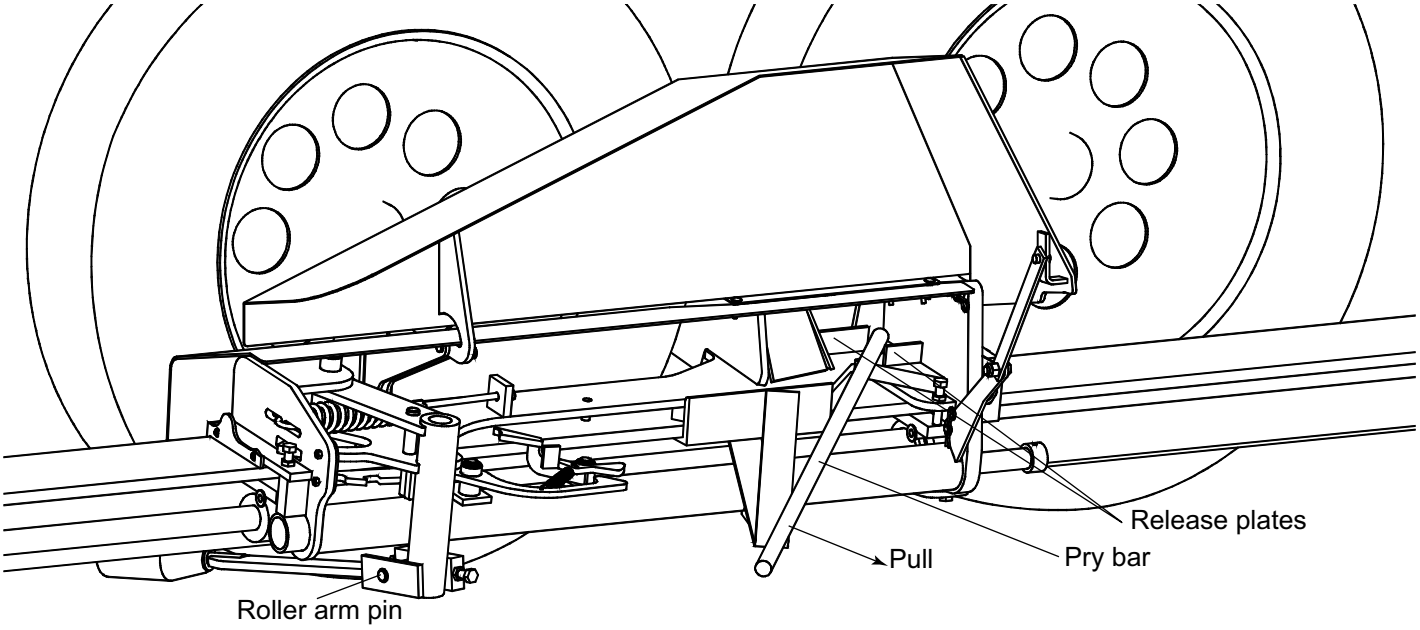
4. Pull on the pry bar until the lock wedge moves past the end of the chock arm.

5. When the lock wedge is clear of the chock, the chock arm will start to retract. The sensing roller will contact the back of the wheel and prevent the chock from fully retracting. As the vehicle slowly moves forward, the wheel will move away from the roller and the chock will fully retract.

6. If the wheel restraint cannot be restored to normal operation, or cannot be moved to the stored position, remove the roller arm pin and the sensing roller arm to prevent damage by the next vehicle.

7. Return the pressure relief valve to the closed position before operating pump.

Fig. 21



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TROUBLESHOOTING GUIDE

Use the Troubleshooting Guide if ever the wheel restraint fails to perform properly. Find the condition that most closely matches your situation, and make the recommended adjustments.

The functions of the wheel restraint are controlled by a Programmable Logic Controller (PLC) which has LED indicator lights to display errors and the state of input and output signals.

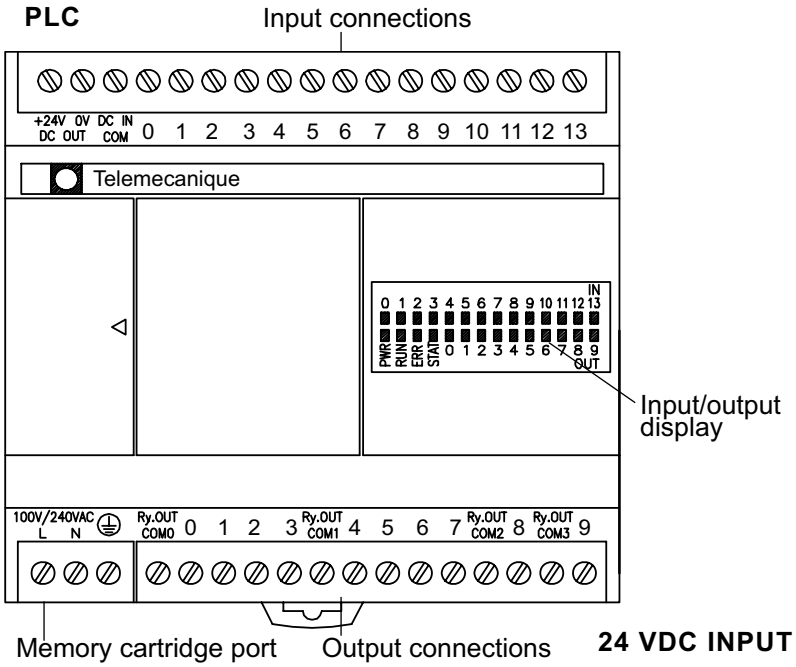
⚠WARNING

Do not service this product unless you have read and followed the Safety Practices, Warnings and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.

⚠DANGER

Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off. All electrical work must be done by a qualified technician and meet all applicable codes. If it is necessary to make troubleshooting checks inside the control box with the power on, USE EXTREME CAUTION. Do not place your fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, death or serious injury.

Fig. 22



PROBLEM	POSSIBLE CAUSE	SOLUTION
A) Motor does not run.		
1. No lights on control panel. No PLC LED indicator lights.	a) No power to control panel.	a) Check for primary power at terminals L1, L2 and L3 (L and N on single phase units).
	b) Blown fuse(s).	b) Check fuse FU1002. Replace if faulty.
	c) Blown transformer primary fuse(s).	c) Check transformer primary fuses, replace if necessary.

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TROUBLESHOOTING GUIDE, continued

Use the Troubleshooting Guide if ever the wheel restraint fails to perform properly. Find the condition that most closely matches your situation and make the recommended adjustments. Observe all safety warnings before attempting any maintenance procedure.

⚠WARNING

Before servicing the wheel restraint, read and follow the Safety Practices on Page 3 and the Operation section in this manual.

PROBLEM	POSSIBLE CAUSE	SOLUTION
2. Some lights on control panel face. No PLC LED output lights on.	a) Program faulty.	a) Reload program - Consult factory.
3. Motor starter does not engage.	a) Incorrect wiring.	a) Check for 120 VAC to solenoid valves.
	b) Hoses Reversed.	b) Check for proper routing of hoses to pump ports.
	c) Fuse FU1011 faulty.	c) Check FU1011. Replace if faulty.
	d) Pressure relief valve open.	d) Check the manual release on solenoid valve 2 (SV2). Make sure manual valve is closed. See Fig. 20.
	e) Solenoid valve problem.	e) If voltage is present, check valves and solenoid coils.
	f) Hydraulic pump problem.	f) If input 3 does not go off, check hydraulic pump.
4. Motor starter engages, but motor does not run, or runs poorly. **⚠WARNING** ***Highly recommend disconnecting the motor leads in the control panel prior to performing tests in this section. Contactor and overload relays will be damaged if connected to a short circuit.***	a) Missing power phase (3 phase motor).	a) Check for voltage across L1-L2, L1-L3, L2-L3. All 3 measured voltages should be nominally equal. If not, check power source.
	b) Damaged contactor.	b) With contactor energized, check for voltage across contactor terminals T1-T2, T1-T3, T2-T3. All 3 measured voltages should be nominally equal. If not, replace contactor.
	c) Damaged overload relay.	c) Repeat as above, but measure voltages across overload terminals T1-T2, T1-T3, T2-T3. If voltage is okay at contactor - overload interface, but not at overload terminals T1-T2-T3, replace overload relay.

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Use the Troubleshooting Guide if ever the wheel restraint fails to perform properly. Find the condition that most closely matches your situation and make the recommended adjustments. Observe all safety warnings before attempting any maintenance procedure.

⚠ WARNING

Before servicing the wheel restraint, read and follow the Safety Practices on Page 3 and the Operation section in this manual.

PROBLEM	POSSIBLE CAUSE	SOLUTION
	d) Wiring faulty.	d) Disconnect motor wires at motor. With motor wires connected in control panel, check for voltage across T1-T2, T1-T3, T2-T3. If voltage is not okay but voltage is okay in control panel, replace wiring.
	e) Motor faulty.	e) If all previous tests are okay and motor does not run, replace motor. Note: Motor rotation must be correct. Refer to startup instructions on page 9.
5. Motor runs but chock housing does not extend.	a) Motor rotation incorrect.	a) Reverse motor rotation by reversing any 2 of the three 3-phase motor supply wires.
	b) Incorrect wiring.	b) Check for 120 VAC to solenoid valves.
	c) Fuse FU1011 faulty.	c) Check fuse FU1011. Replace if faulty.
	d) Solenoid valve problem.	d) If voltage present, check valves and solenoid coils.
	e) Hydraulic pump problem.	e) If input 3 does not go off, check hydraulic pump.
	f) Manual release knob (SV1) is open.	f) Push knob in and rotate clockwise. See Fig. 19.

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TROUBLESHOOTING GUIDE, continued

Use the Troubleshooting Guide if ever the wheel restraint fails to perform properly. Find the condition that most closely matches your situation and make the recommended adjustments. Observe all safety warnings before attempting any maintenance procedure.

⚠ WARNING

Before servicing the wheel restraint, read and follow the Safety Practices on Page 3 and the Operation section in this manual.

PROBLEM	POSSIBLE CAUSE	SOLUTION
6. Chock housing moves, but chock arm does not fully extend.	a) Sensing roller problem.	a) Check that the chock does not strike the side of the wheel as it extends Adjust roller arm if necessary.
	b) Pressure switch problem.	b) Adjust pressure switch setting to 450 PSI. Replace if faulty.
	c) Arm Latch and Release weldments not pivoting freely.	c) Lubricate weldment pivots and the edges where these two parts make contact. See page 18, Quarterly Maintenance.
7. Chock will not engage or disengage.	a) Carriage guide rollers are incorrectly adjusted, and not rolling smoothly.	a) Adjust all cam rollers so that the carriages slide smoothly on the rail. Clean, lubricate and adjust cam rollers.
8. Motor runs and chock housing moves, but chock arm assembly will not release wheel.	a) Chock wedging on front of wheel.	a) Check that the sensing roller is not too close to the back of the wheel. Adjust roller arm if necessary.
	b) "Extend Latch" did not release.	b) Re-engage the wheel, using “Jog Mode” if required. Disconnect electrical power and inspect latch.
9. No outside lights on.	a) Fuse FU1005 faulty.	a) Check fuse FU1005. Replace if faulty.
	b) LED(s) burnt out.	b) Check LED(s) in outside lights. Replace if faulty.
10. Restraint operates properly. Some PLC LED indicator lights on. No lights on control panel face.	a) LED(s) burnt out.	a) Check LED(s) in panel face lights. Replace if faulty.

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CONTROL PANEL — LED DISPLAY

The wheel restraint is controlled by a solid-state programmable logic controller (PLC) which reads input signals from the push-buttons and proximity sensors, and closes the appropriate output relays to the motor and to the warning lights.

Input Signals

0 - Restraint Override/Lights Only not selected
1 - PRS1: Carriage Retracted proximity sensor ON
2 - PRS2: Chock Arm Retracted proximity sensor ON
3 - PS1: N/C Pressure switch OFF
4 - Reserved
5 - Reserved
6 - **ENGAGE** button depressed
7 - **RELEASE** button depressed
8 - Door opened (N/A for standard panel applications)
9 - Door closed
10 - Leveler stored proximity sensor ON
11 - Reserved
12 - Snugging enabled
13 - **STOP** button pulled out

Output Signals

0 - Inside RED lamp ON
1 - Inside AMBER lamp ON
2 - Inside GREEN lamp ON
3 - Outside GREEN lamp relay ON
4 - Solenoid valves ON (carriage moving forward)
5 - Reserved
6 - TNF Alarm (pulsed output; optional)
7 - Motor
8 - Motion Alarm (pulsed output)
9 - Leveler Interlock (restraint engaged and door opened if applicable)

DIAGNOSTICS MODE — PLC LED DISPLAY

The PLC continuously monitors system operation and will indicate when it is malfunctioning. If an error occurs that could be potentially dangerous, the restraint will halt operation and the inside panel lamps will display an indication of the error.

If a restraint fault has occurred:

- Inside RED lamp is on.
- Inside AMBER lamp is flashing a trouble code.
- Jog mode is automatically activated.

To identify the specific problem, count the flashes of the AMBER lamp and compare the number to the table below. The count sequence will be repeated until the cause of the restraint fault is corrected and the **RELEASE** push-button is pressed. A two second pause between flash sequences is employed.

Trouble Code Definitions

Trouble Code	Trouble Definition
2	Did not lose LS1, LS2 and PS1 after leaving the home position
3	Possible obstruction encountered while retracting or an LS failure
4	PS1 failed open or carriage has traveled to far end of the rail
5	Motor run timeout exceeded
6	LS present while carriage locked or moving forward
7	Loss of LS's while restraint is home

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PLC DIAGNOSTICS, continued

OPERATING MODE — PLC LED DISPLAY

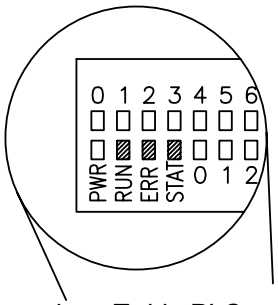
CONTROLLER FAULT CONDITIONS

RUN LED (Green)

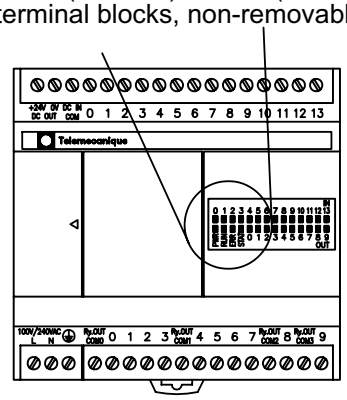
- ☐ Application not executed
- ▨ Controller is in RUN mode
- F Controller is in STOP mode, or execution fault (HALT)

ERR LED (Red)

- ☐ OK
- ▨ Internal faults (watchdog, etc.)
- F Application not executable, or execution error (HALT)



Telemecanique Twido PLC, model no. TWDLCAA24DRF. Compact base unit, 230V AC, with 14" (24V DC), 10 out (2A relays). Screw terminal blocks, non-removable.

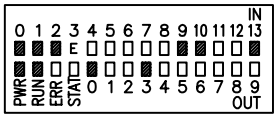


LEGEND

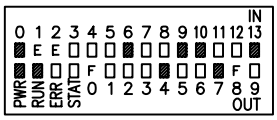
- ☐ LED OFF
- ▨ LED ON
- F LED Flashing
- E LED ON or OFF (either condition may be present during the course of given sequence)

LED Indicators

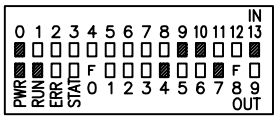
NORMAL OPERATING SEQUENCES



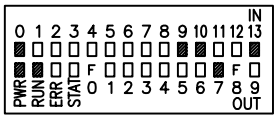
HOME
Carriage fully retracted (stored)



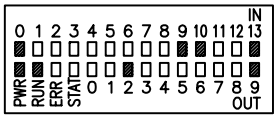
STEP 1
Initial departure



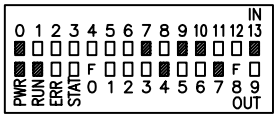
STEP 2
Carriage extending



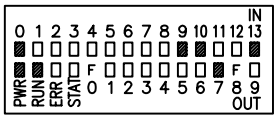
STEP 3
Carriage retracting



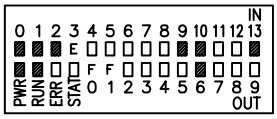
STEP 4
Chock fully engaged
(tire gripped)



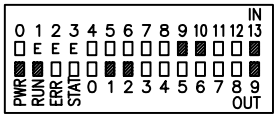
STEP 5
Carriage extending
(releasing)



STEP 6
Carriage retracting (releasing)



TNF
Truck not found



RESTRAINT OVERRIDE
Restraint override condition

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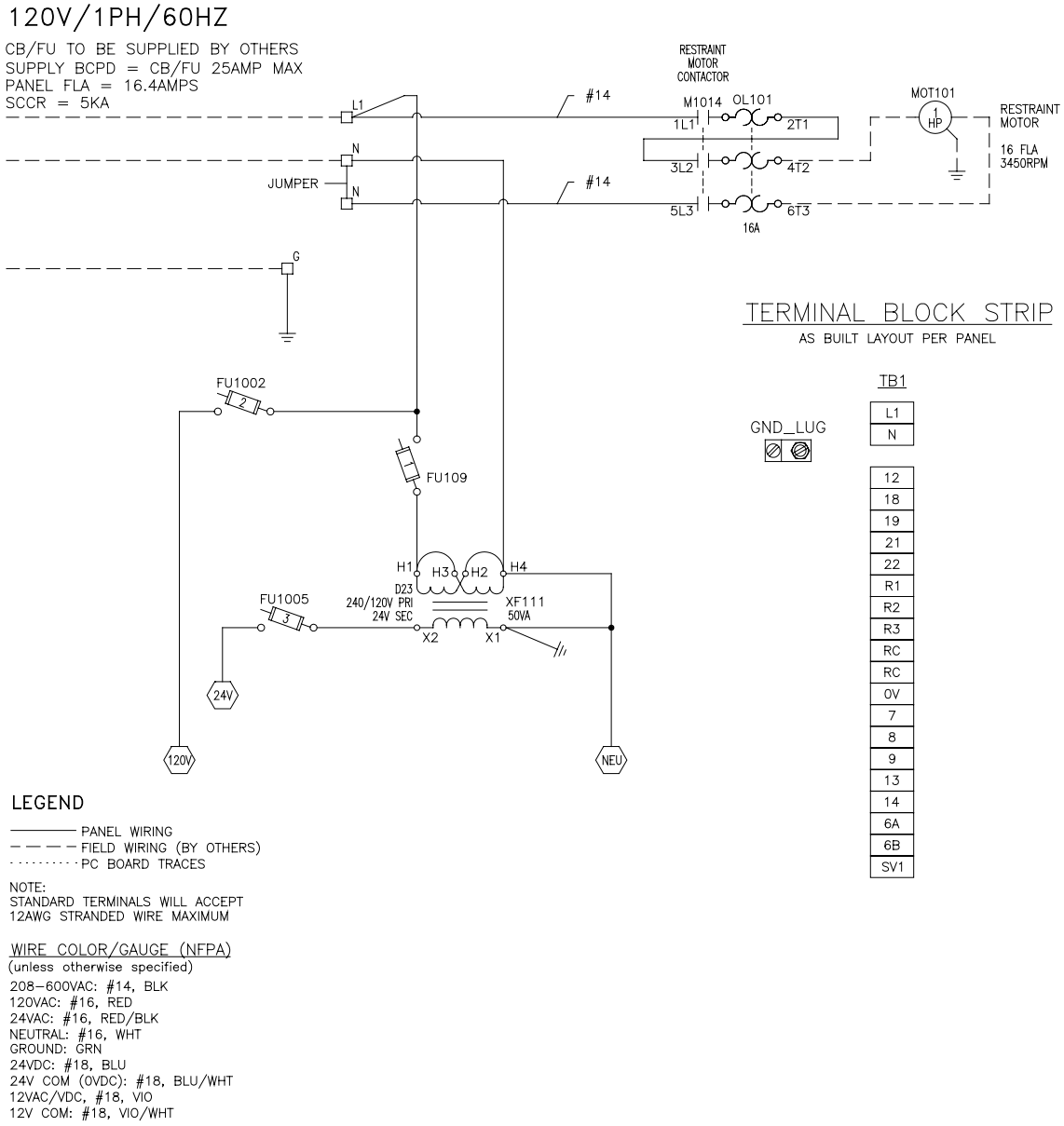
ELECTRICAL SCHEMATIC

Fig. 23



NOTE:

Power to control panel must be from fused disconnect supplied by others. Max (Type CC) fuse size shown above.

⚠DANGER

Before doing any electrical work, make certain the power is disconnected and properly tagged or locked off. All electrical work must be done by a qualified technician and meet all applicable codes. If it is necessary to make troubleshooting checks inside the control box with the power on, USE EXTREME CAUTION. Do not place your fingers or uninsulated tools inside the control box. Touching wires or other parts inside the control box could result in electrical shock, death or serious injury.

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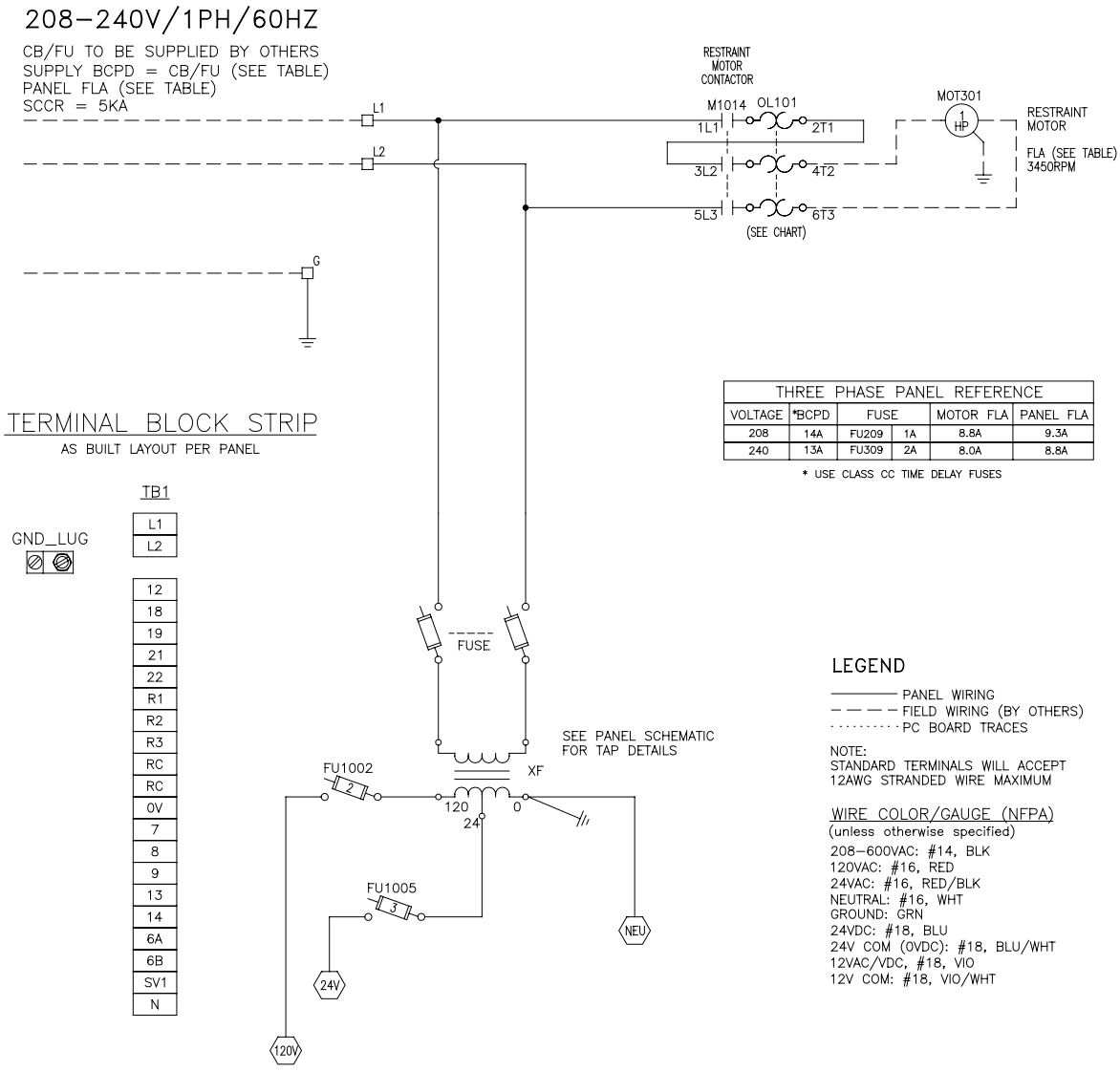
ELECTRICAL SCHEMATIC, continued

Fig. 24



NOTE:

Power to control panel must be from fused disconnect supplied by others. Max (Type CC) fuse size shown above.

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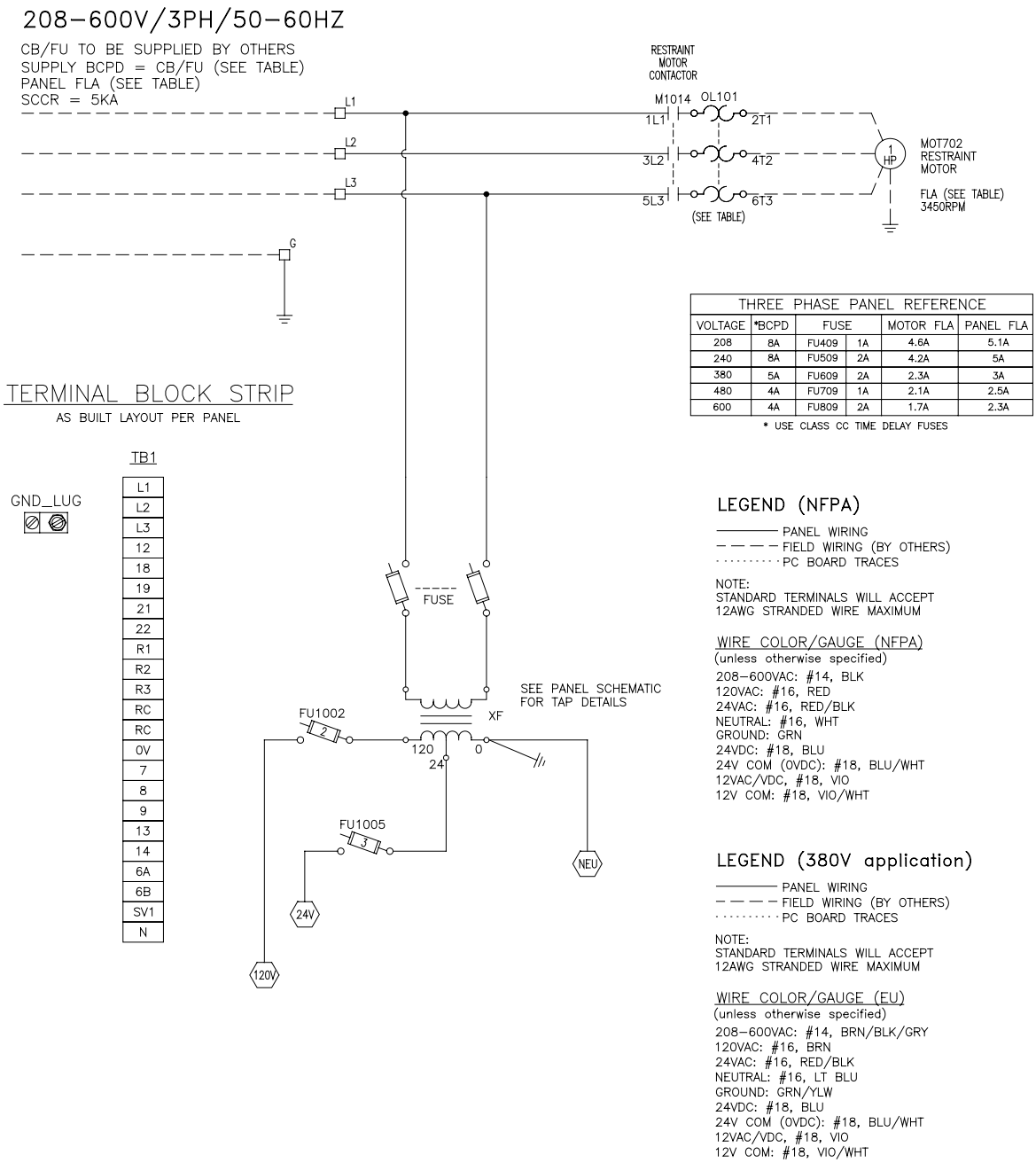
Fig. 25



THREE PHASE PANEL REFERENCE					
VOLTAGE	*BCPD	FUSE		MOTOR FLA	PANEL FLA
208	8A	FU409	1A	4.6A	5.1A
240	8A	FU509	2A	4.2A	5A
380	5A	FU609	2A	2.3A	3A
480	4A	FU709	1A	2.1A	2.5A
600	4A	FU809	2A	1.7A	2.3A

* USE CLASS CC TIME DELAY FUSES

LEGEND (NFPA)

———— PANEL WIRING
– – – – FIELD WIRING (BY OTHERS)
· · · · · · · · · · PC BOARD TRACES

NOTE:
STANDARD TERMINALS WILL ACCEPT
12AWG STRANDED WIRE MAXIMUM

WIRE COLOR/GAUGE (NFPA)
(unless otherwise specified)

208–600VAC: #14, BLK
120VAC: #16, RED
24VAC: #16, RED/BLK
NEUTRAL: #16, WHT
GROUND: GRN
24VDC: #18, BLU
24V COM (0VDC): #18, BLU/WHT
12VAC/VDC, #18, VIO
12V COM: #18, VIO/WHT

LEGEND (380V application)

———— PANEL WIRING
– – – – FIELD WIRING (BY OTHERS)
· · · · · · · · · · PC BOARD TRACES

NOTE:
STANDARD TERMINALS WILL ACCEPT
12AWG STRANDED WIRE MAXIMUM

WIRE COLOR/GAUGE (EU)
(unless otherwise specified)

208–600VAC: #14, BRN/BLK/GRY
120VAC: #16, BRN
24VAC: #16, RED/BLK
NEUTRAL: #16, LT BLU
GROUND: GRN/YLW
24VDC: #18, BLU
24V COM (0VDC): #18, BLU/WHT
12VAC/VDC, #18, VIO
12V COM: #18, VIO/WHT

NOTE:

Power to control panel must be from fused disconnect supplied by others. Max (Type CC) fuse size shown above.

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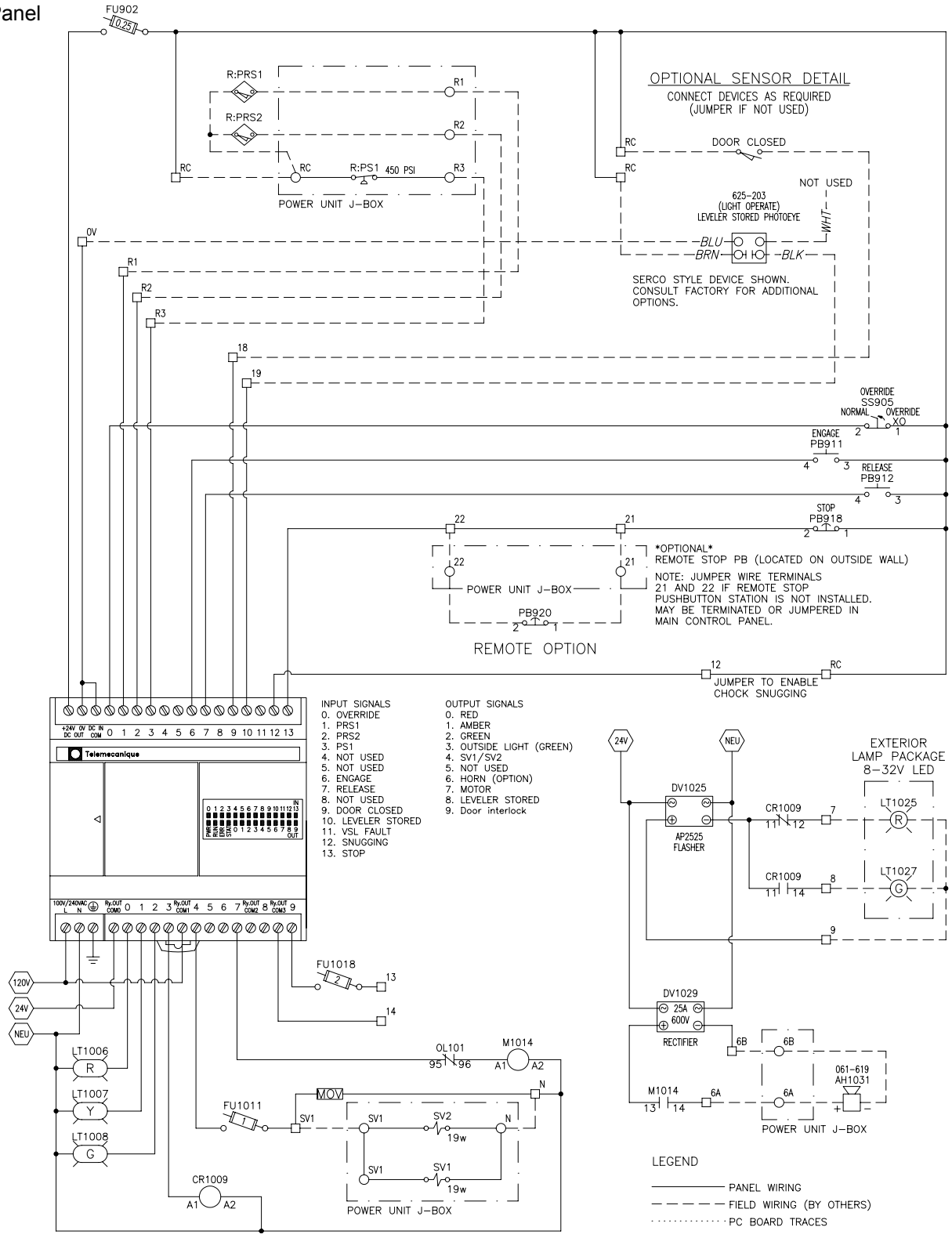
ELECTRICAL SCHEMATIC, continued

Fig. 26

Control Panel



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⚠WARNING

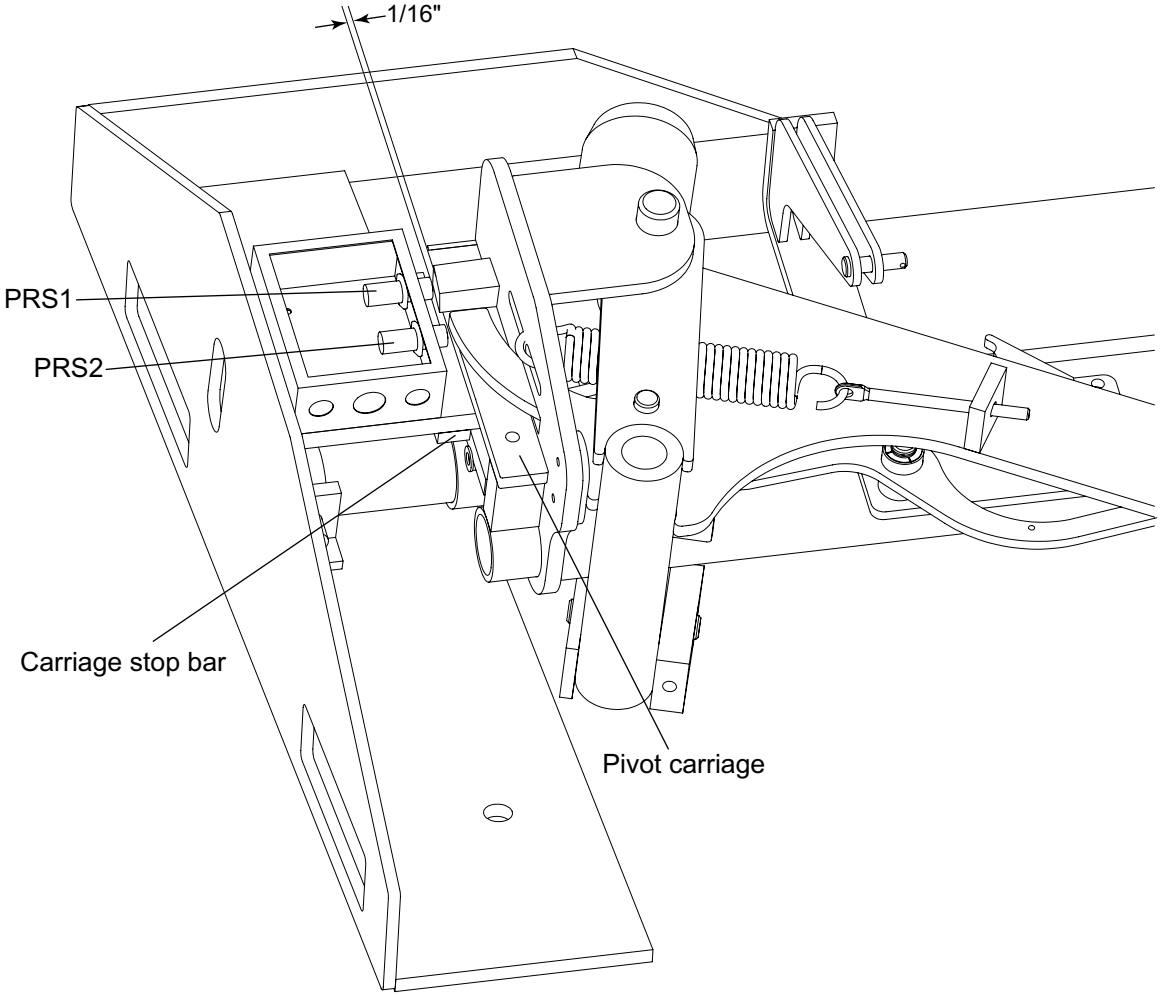
Do not service this product unless you have read and followed the Safety Practices, Warnings and Operation instructions contained in this manual. Failure to follow these safety practices could result in death or serious injury.

Use these instructions to adjust the wheel restraint.

PROXIMITY SENSORS — PRS1 AND PRS2

Two proximity sensors are used to sense the various positions of the wheel restraint. The sensors are solid state proximity sensors which close an electrical circuit when they sense the presence of a steel target. The locations of these sensors are shown below. To access these sensors, first remove the cover at the rear of the chock rail by removing the two screws which hold it into place. Before adjusting either PRS1 or PRS2, be sure that the pivot carriage is fully retracted. Adjust the position of the proximity sensors using two 15/16" open end wrenches to loosen the holding nuts. Then adjust the proximity sensor inward or outward as shown and tighten the nuts to 11 ft/lbs to secure the sensor. The face of the proximity sensor should be 1/16" from the target plate.

Fig. 27



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ADJUSTMENTS, continued

Use these instructions to adjust the wheel restraint.

HYDRAULIC PRESSURE SWITCH — PS1

When the wheel restraint encounters an obstacle, such as a vehicle wheel, the hydraulic pressure rises. This causes the pressure switch PS1 to open an electrical contact. The pressure switch is factory set at approximately 450 PSI. However, if the chock carriage reverses before the chock fully extends, the pressure may be increased by turning the adjusting wheel clockwise. If the chock fully extends and does not reverse but the pump still runs, then the pressure switch is set too high, not allowing the electrical contact to open. Decrease pressure by turning the adjusting screw counter-clockwise.

HYDRAULIC POWER UNIT SETUP PROCEDURE

1. A 1500 PSI full scale, 2-1/2" liquid filled hydraulic pressure gage is furnished with the power unit.

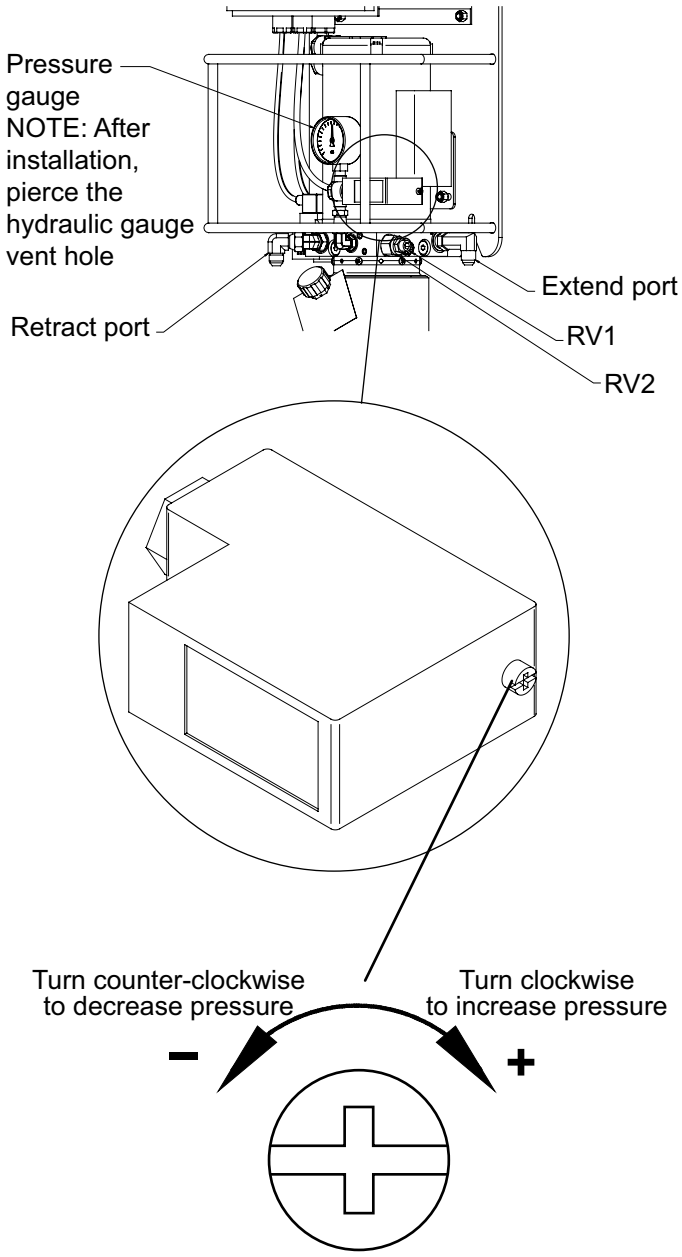
2. Loosen the jamb nut on the Relief Valve (RV1). Turn the hex set screw adjustment CCW 2 turns. Note: you are decreasing the amount of force on a spring. A small amount of tension must be felt on the spring – do NOT allow the adjusting screw to fall out. The SLSC must be in the stored position for these adjustments (PLC inputs for LS-1 and LS-2 should be ON).

3. Using a #2 Phillips screwdriver, adjust the pressure switch via the plastic screw on top of the switch. Set the pressure to approx. 550 PSI as indicated on the scale on the front of the switch.

4. Turn and hold the **LIGHTS ONLY** selector switch CW, and press **RELEASE**. The motor will run, and the gage will indicate relief pressure. If the gage pressure is less than 450 PSI, slowly turn the relief pressure adjustment CW, and stop when the gage indicates approx. 475 PSI. If the gage pressure is greater than 450 PSI, turn the relief valve (RV1) CCW one turn, then relieve system pressure by pressing in and turning the manual relief knob CCW on SV2. See Fig. 20.

5. Let go of the **RELEASE** push-button, stopping the motor. The gage should read 450 PSI with the motor stopped. (475 PSI with motor running will drop to approx. 450 PSI when the motor stops). If the gage does not read 450 PSI, repeat step 3.

Fig. 28



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6. If you pre-set the pressure switch to 550 PSI as per step #3, the pressure switch input on the PLC should be ON. With the gage holding at 450 PSI, turn the pressure switch adjusting screw CCW while your helper watches the pressure switch PLC input light. STOP when the PLC input light goes OFF. The pressure switch is now set.

7. Turn and hold the **LIGHTS ONLY** selector switch CW, and press **RELEASE**. While the motor is running, turn the Relief Valve adjusting screw CW until the gage indicates 800 PSI. Stop the motor and replace the sealing cap on the Relief Valve. Primary relief pressure is now set.

Use these instructions to adjust the wheel restraint.

SENSOR ROLLER ARM ADJUSTMENT

The distance from the front of the sensing roller to the chock surface is initially set at 32". See Fig. 29. If the chock drags on the front of the wheel or does not properly release the wheel, increase the distance. If the tip of the chock strikes the forward tire of tandem axles, then decrease the distance. To adjust the distance of the sensing roller:

1. Follow step 17 on page 12 of the startup instructions. With the test bar locked against the wall, press stop. Mark a line on the driveway directly below the face of the chock arm.

2. Measure the distance from the front of the sensing roller to the line under the chock.

3. To change the distance, use the adjusting bolts to move the roller arm pivot pin as shown in the drawing below. When adjustment is complete, secure the position of the adjusting bolts with the jam nuts. Do not overtighten the adjusting bolts.

4. To restore the chock, press the **RELEASE** button. The chock carriage will return to the stored position.

Fig. 29

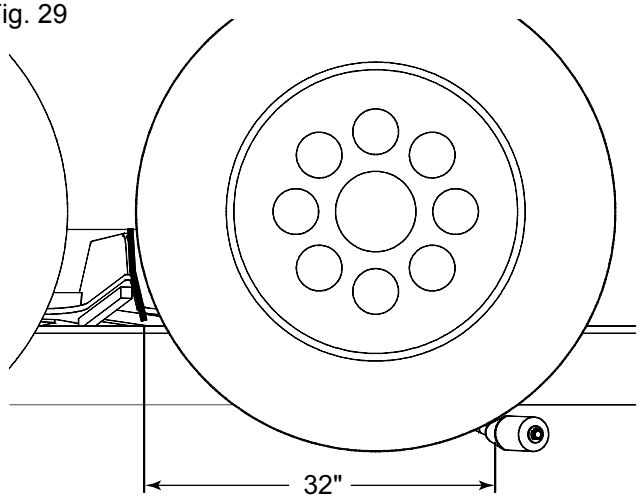
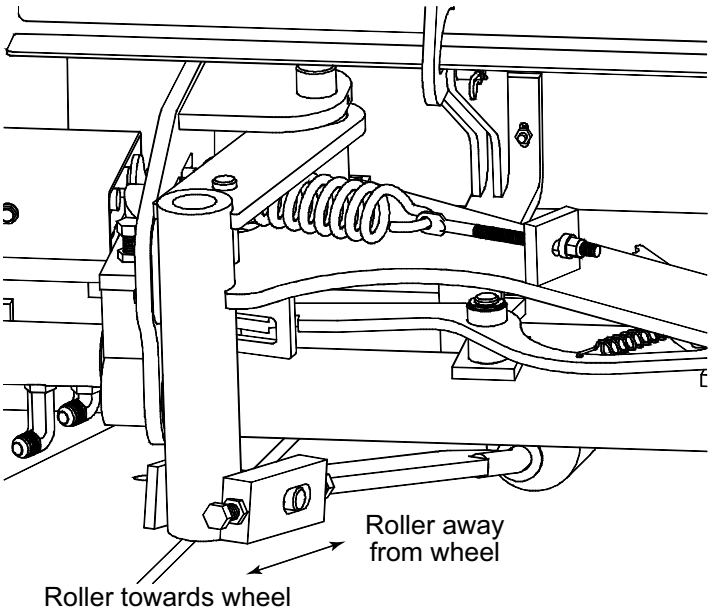


Fig. 30



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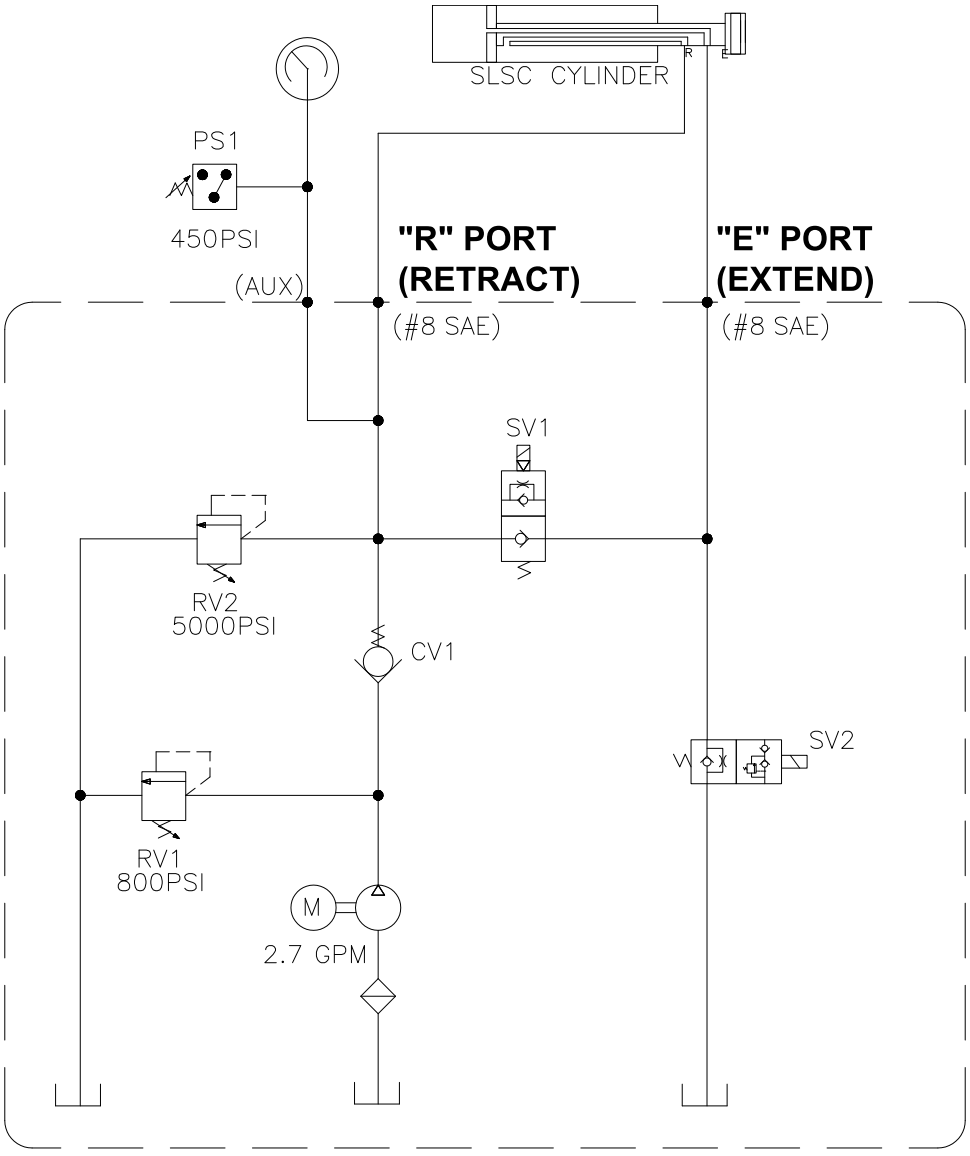
HYDRAULIC SCHEMATIC

Fig. 31



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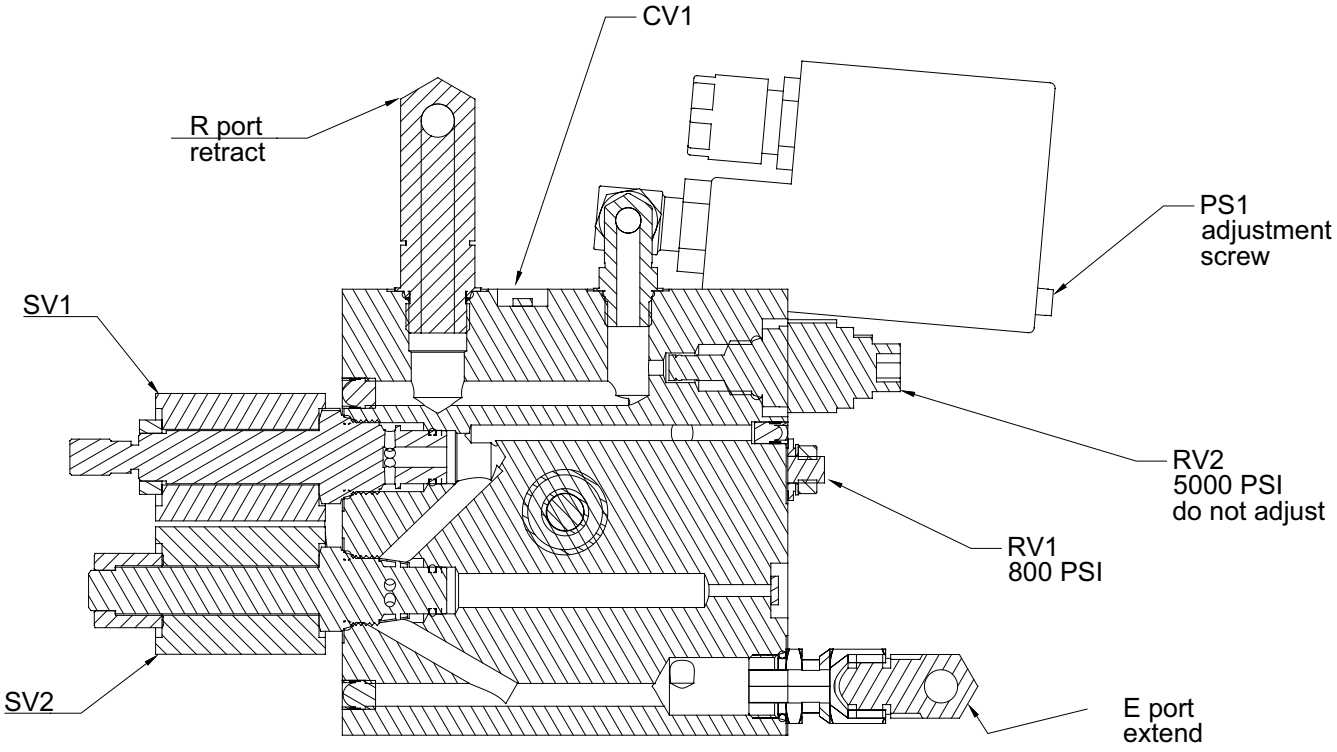
HYDRAULIC VALVE CROSS SECTION

Fig. 32



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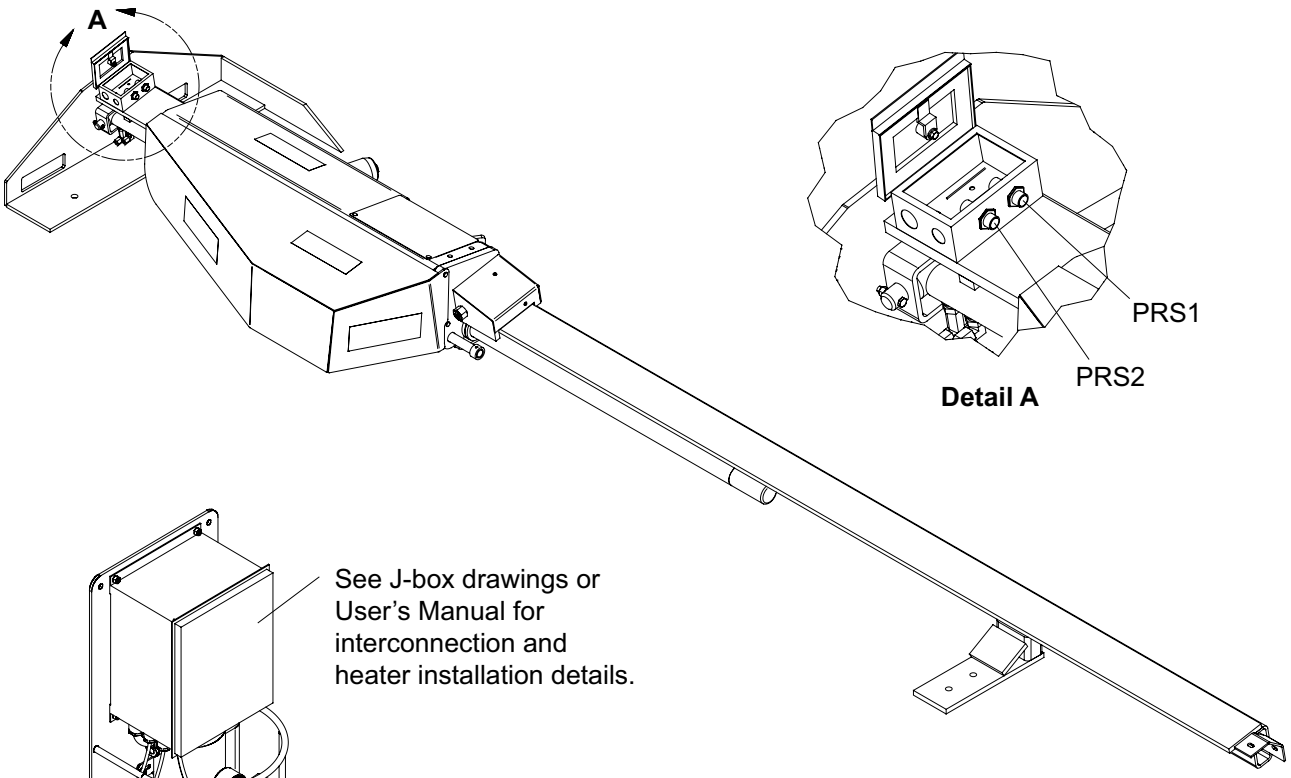
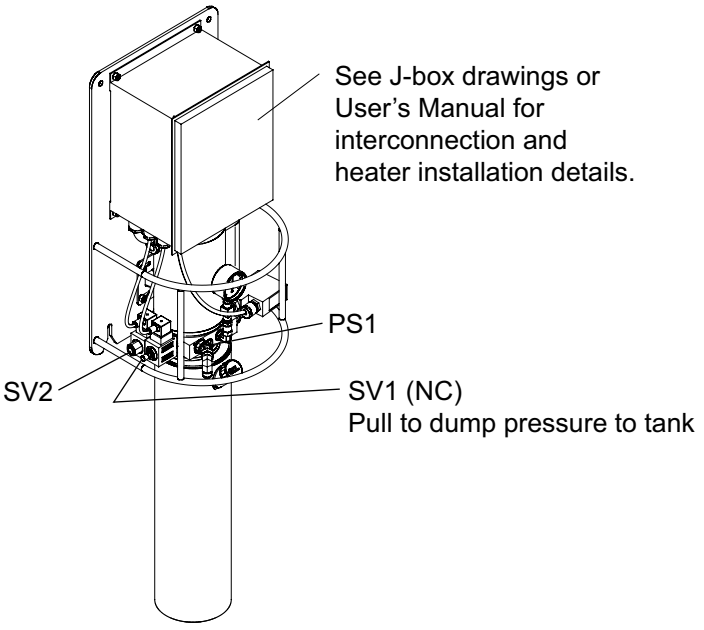
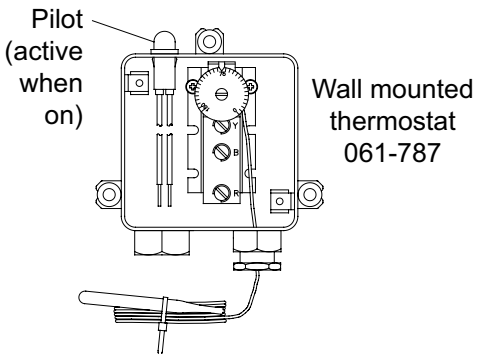
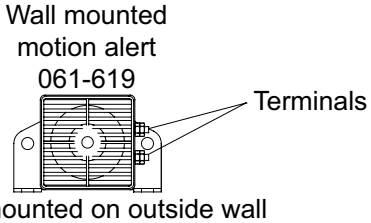
POWER UNIT J-BOX

Fig. 33









To be mounted on outside wall
on the same side as the chock unit.

Power Unit J-Box	
Part Number	Application
6012068	No heater
6012019	120VAC with heater
6012069	208-600VAC with heater

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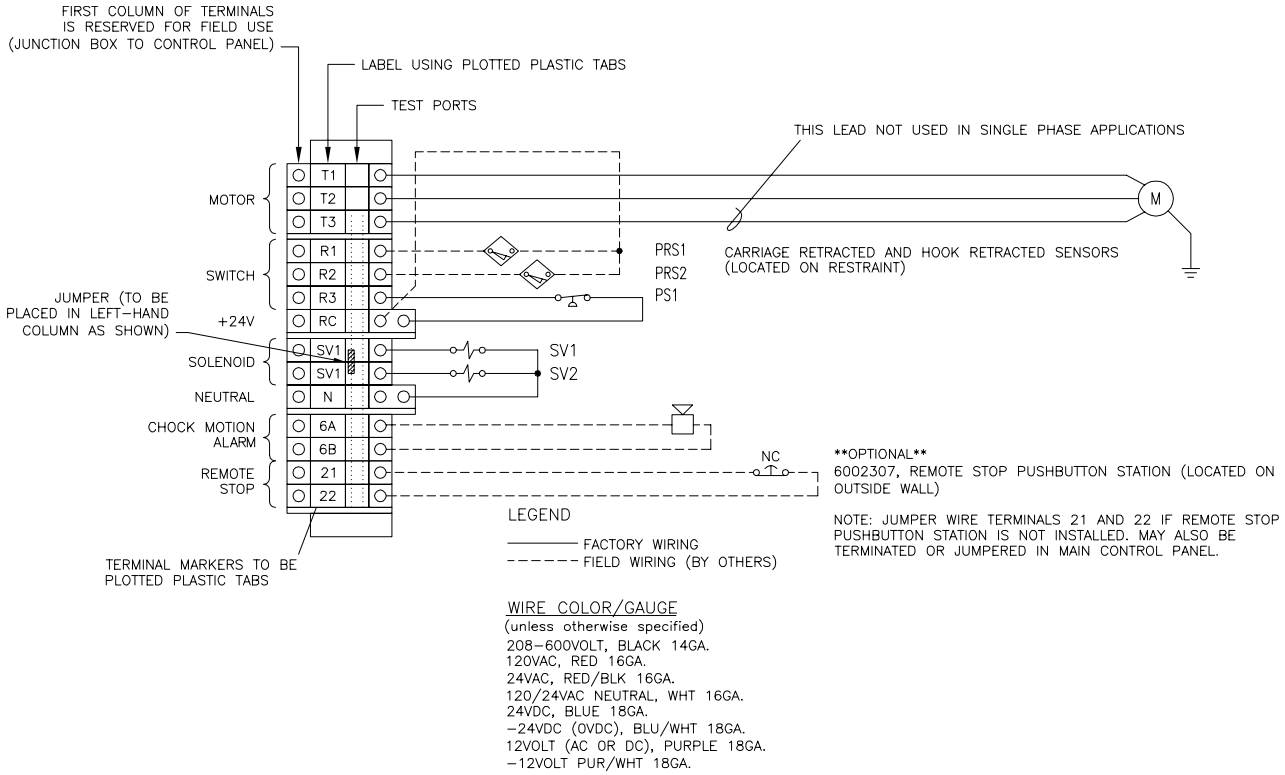
NO HEATER — 6012068

Fig. 34



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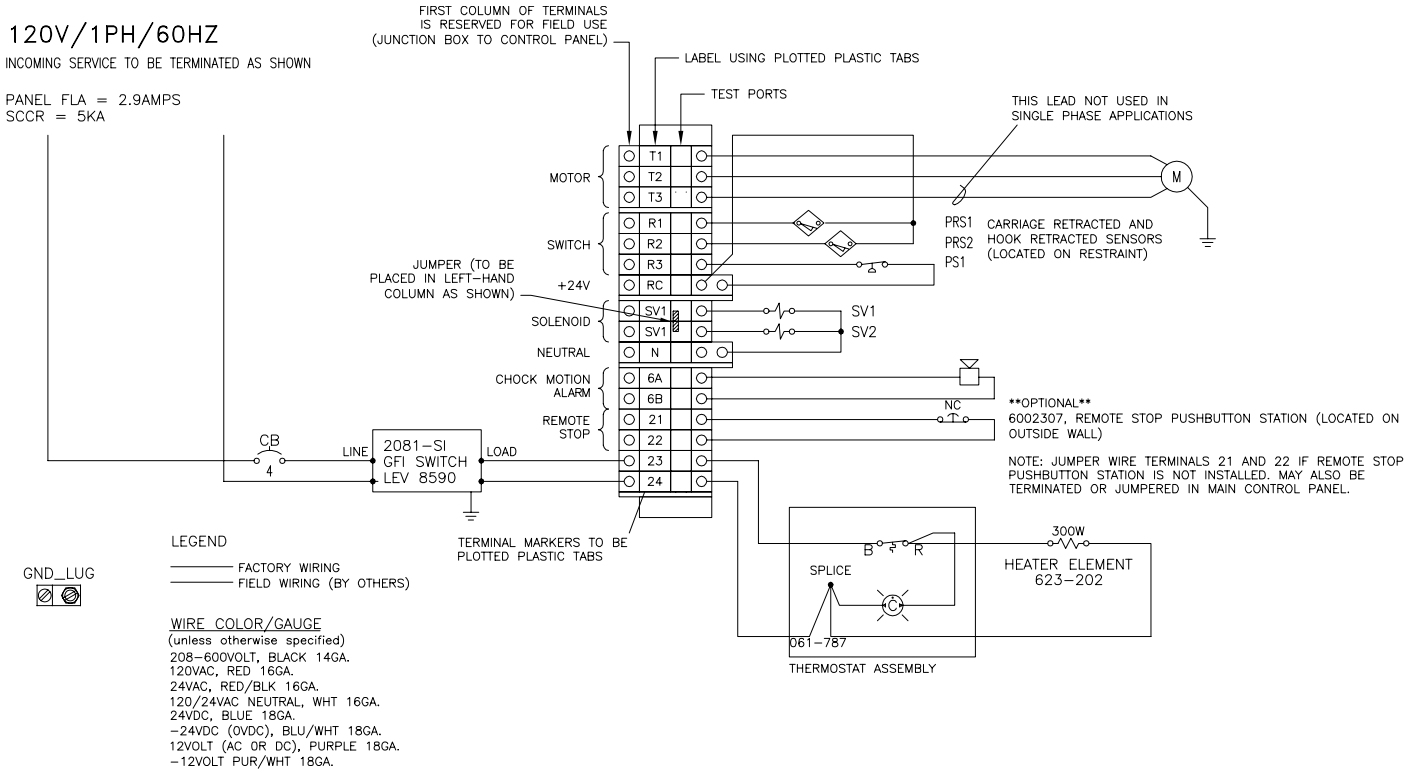
POWER UNIT J-BOX, continued

120VAC WITH HEATER — 6012019

Fig. 35



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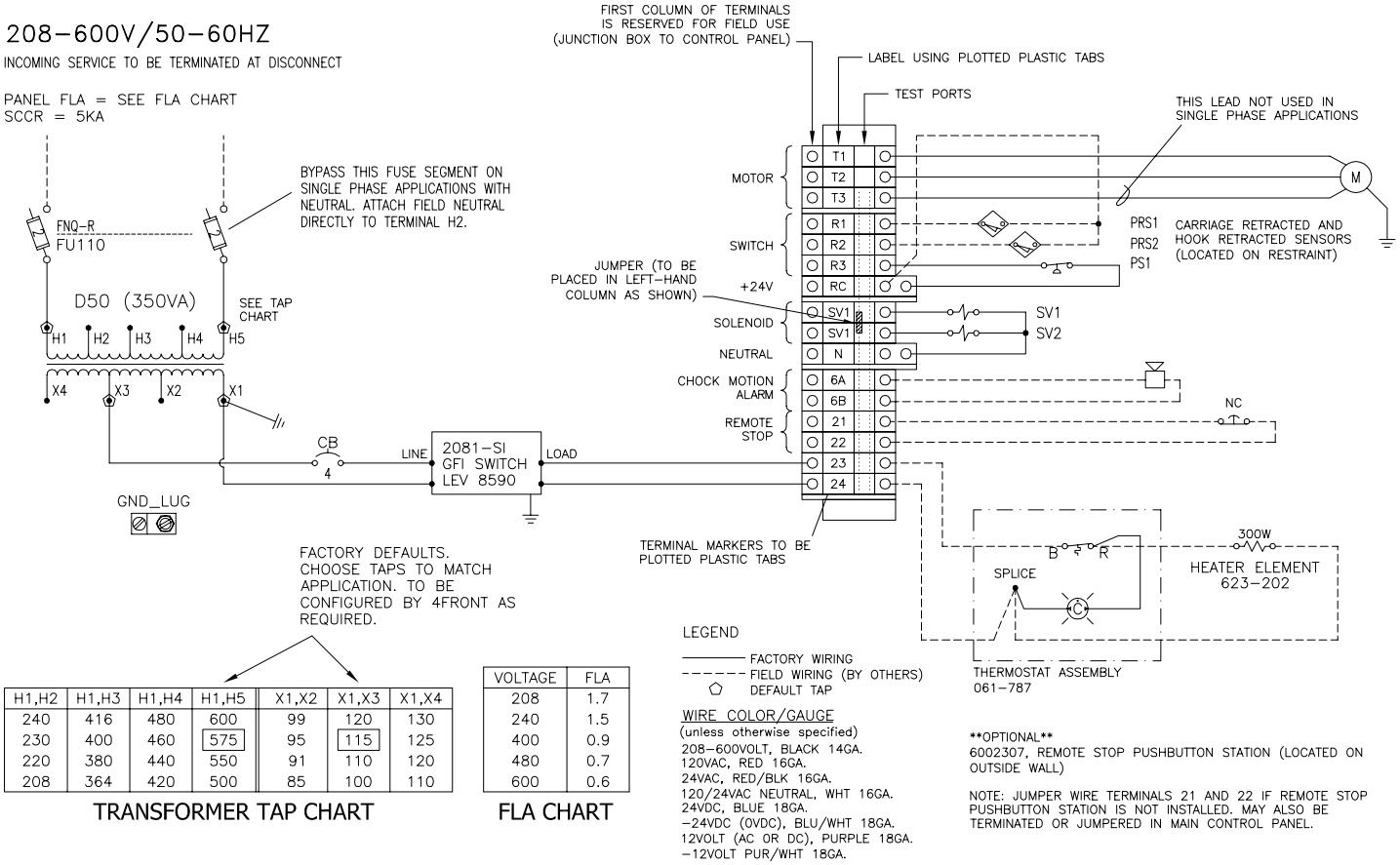
208-600VAC WITH HEATER — 6012069

Fig. 36



H1,H2	H1,H3	H1,H4	H1,H5	X1,X2	X1,X3	X1,X4
240	416	480	600	99	120	130
230	400	460	575	95	115	125
220	380	440	550	91	110	120
208	364	420	500	85	100	110

TRANSFORMER TAP CHART

VOLTAGE	FLA
208	1.7
240	1.5
400	0.9
480	0.7
600	0.6

FLA CHART

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PARTS LIST — WHEEL RESTRAINT

⚠WARNING

To ensure proper function, durability and safety of the product, only replacement parts that do not interfere with the safe, normal operation of the product must be used. Incorporation of replacement parts or modifications that weaken the structural integrity of the product, or in any way alter the product from its normal working condition at the time of purchase from 4Front Engineered Solutions, Inc. may result in product malfunction, breakdown, premature wear, death or serious injury.

Fig. 37

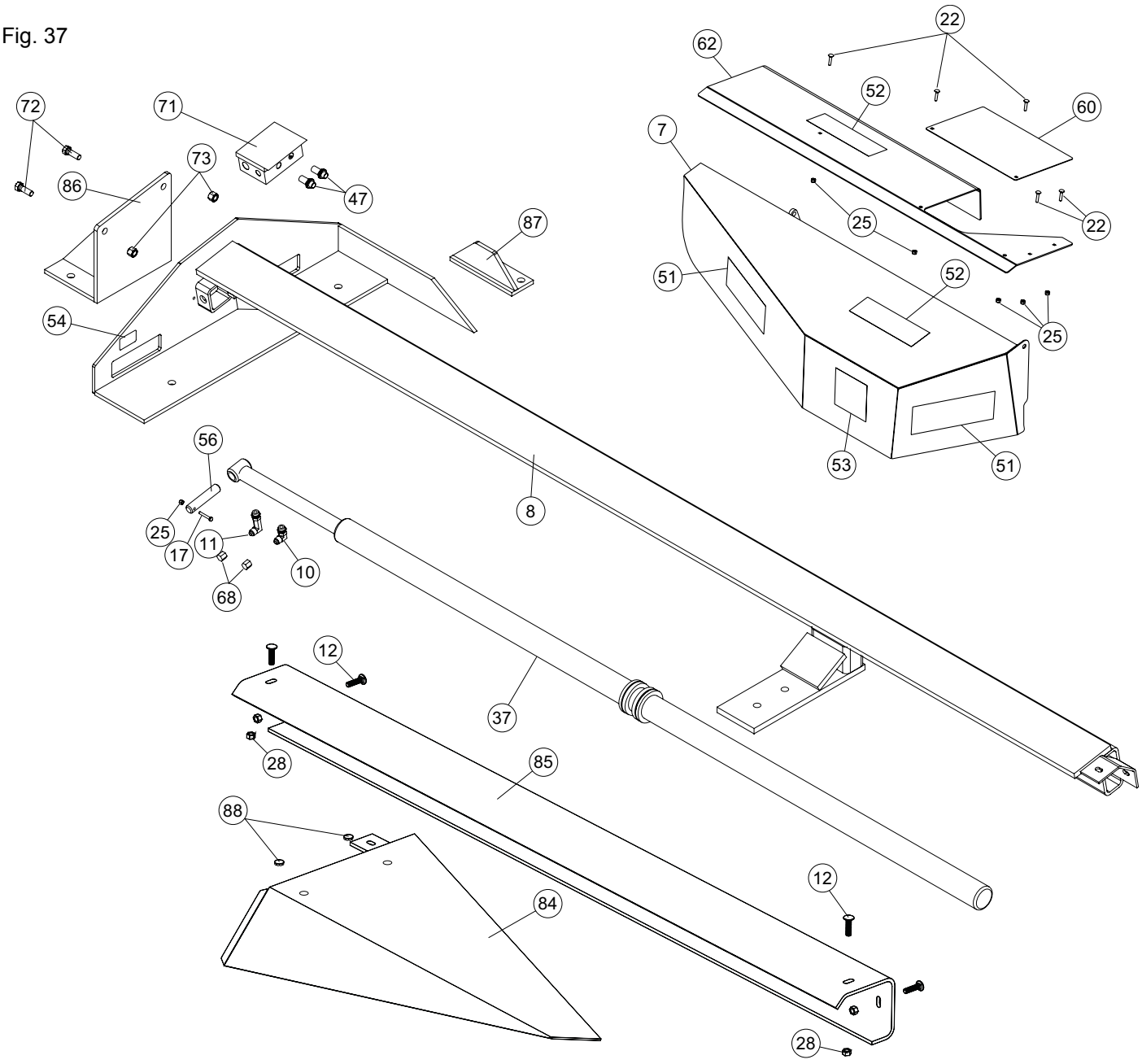

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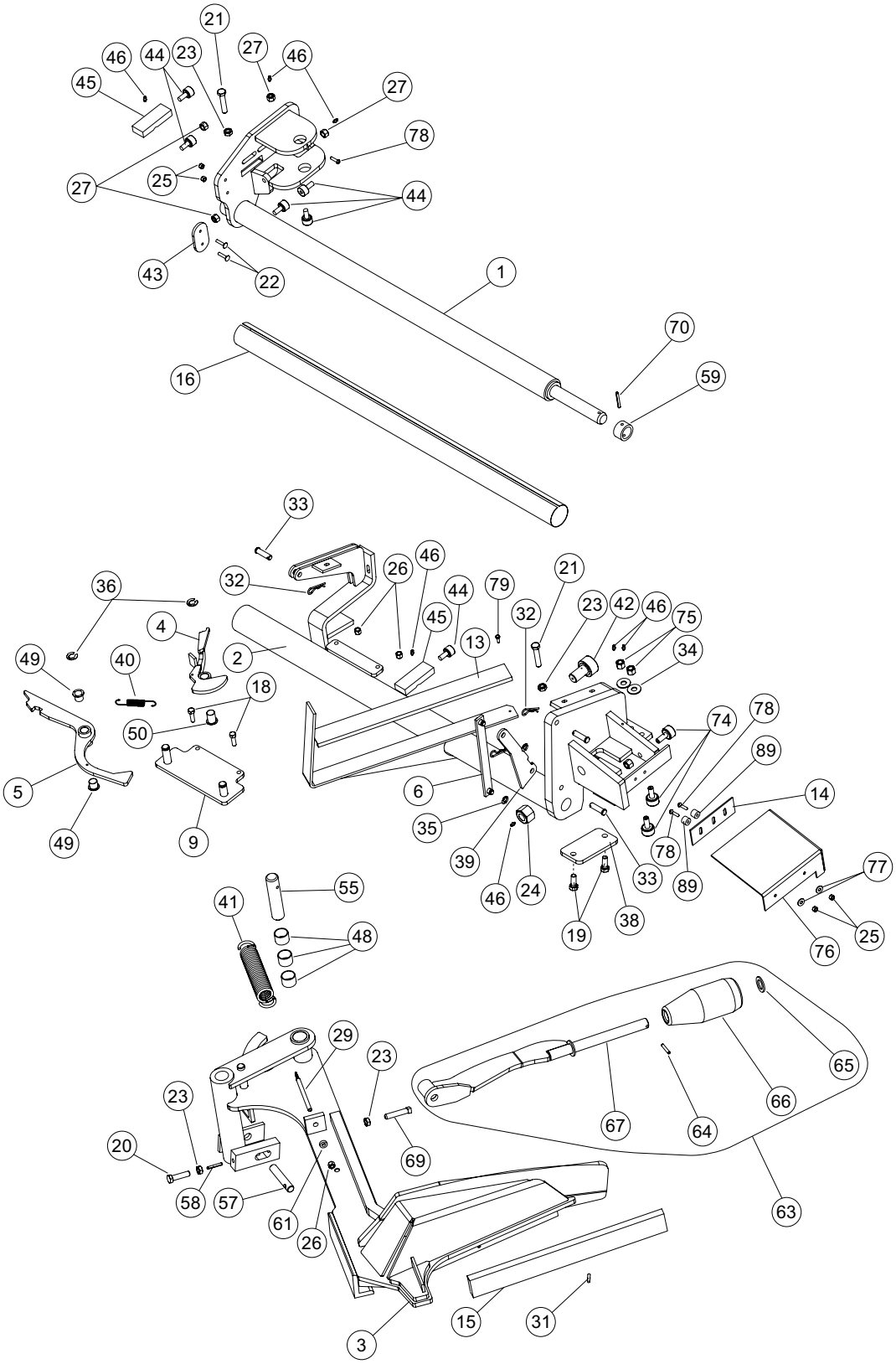
Fig. 38



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PARTS LIST — WHEEL RESTRAINT, continued

Item	Quantity	Part Description	Part Number
1	1	CHOCK CARRIAGE ASSEMBLY	30701
2*	1	CHOCK LOCK WELDMENT	6005615
3**	1	CHOCK ARM WELDMENT	30703
4†	1	ARM LATCH WELDMENT (MUST BE ORDERED WITH P/N 30706)	30705
5†	1	ARM RELEASE WELDMENT (MUST BE ORDERED WITH P/N 30705)	30706
6	1	PROP ROD ASSEMBLY	30708
7§	1	COVER WELDMENT	6005621
8	1	RAIL ASSEMBLY	30710
9	1	LATCH PIVOT PLATE ASSEMBLY	30715
10	1	ELBOW	031120
11	1	ELBOW	031447
12	4	CARRIAGE BOLT — 1/2" X 1-1/2" LG.	213140
13*	1	WEAR STRIP - ARM	153108
14	1	WEAR PAD - SCRAPER	153110
15**	1	CHOCK ARM WEAR STRIP	153111
16	1	GUIDE TUBE WEAR STRIP	153112
17	1	HEX BOLT 1/4-20 UNC - 2.5 - GR5	6004764
18	2	HEX HEAD MACHINE BOLT 3/8 - 16 - 11/4	212104
19	2	HEX BOLT 1/2-13 UNC - 1.25 - GR5	212203
20	1	HEX CAP SCREW - 1/2-13 UNC - 2	212207
21	2	HEX CAP SCREW - 1/2-13 UNC - 2.5	212230
22	7	CARRIAGE BOLT 1/4-20 UNC - 1.25IN	213019
23	4	HEX JAM NUT - 1/2-13 UNC	214242
24	1	NYLON LOCK NUT - 1-14 UNS	214351
25	10	NYLON LOCK NUT - 1/4-20 UNC	214502
26	3	NYLON LOCK NUT - 3/8-16 UNC	214538
27	4	NYLON LOCK NUT - 7/16-20 UNF	214552
28	4	LN 1/2 — 13 UNC NYLOCK, ZINC PLATED	214-505
29	1	LR-3/8 16UNC X 5.125	216257
30	1	COVER ASSEMBLY — NOT SHOWN	6005709
31**	1	RP - 1/4 X 1-1/2	6008645
32	3	1/8 DIA. HITCH PIN CLIP	231503
33	3	CLEVIS PIN	231505
34	2	PLAIN WASHER 1/2 - 0.562ID X 0.109 OD	234121
35	2	KLIPRING, TRUARC - 1/2 IN, T5304-50	236106
36	2	KLIPRING, TRUARC - 3/4 IN, T5304-75	236110
37	1	HYDRAULIC CYLINDER	313584
38	1	CYLINDER SUPPORT BAR	6005625
39	1	COVER PROP ROD “A”	328604
40†	1	LATCH BAR RETURN SPRING	333045
41	1	ARM RETURN SPRING	333048
42	1	1-7/8 CAM FOLLOWER BEARING	341001
43	1	RUBBER ARM STOP	341028
44	6	1" CAM FOLLOWER BEARING	341029
45	2	CAM ROLLER BAR	341032

*Included with item 81. **Included with item 82. †Included with item 80. ‡Included with item 62. §Included with item 30. •Included with item 63.

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PARTS LIST — WHEEL RESTRAINT, continued

Item	Quantity	Part Description	Part Number
46	10	GREASE FITTING, DRIVE FIT	417113
47	2	LS1, LS2 PROXIMITY SWITCH (C/W HARDWARE)	625036
48**	3	EM-BUSHING-DU 1-1/4X1-20DU16	821032
49†	2	BUSHING, NYLINER - 12L12F	821040
50†	1	NYLINER - 12L18F	821041
51§	2	LABEL - KEEP CLEAR, SLSC	921087
52§‡	2	LABEL - NO STEP, SLSC	921088
53	1	LABEL, SERCO® BRAND	921185
		LABEL, KELLEY® BRAND	921186
54	1	SERIAL TAG	6009761
55	1	MAIN ARM PIN	4870001
56	1	CYLINDER PIN	4870002
57	1	ROLLER ARM PIN	4870003
58	1	SENSOR ARM ADJUSTING PIN	4870004
59	1	CARRIAGE GUIDE COLLAR	4870007
60	1	FLIP COVER	4870047
61	1	HOLD DOWN BAND SPACER	5860973
62	1	SHIELD ASSEMBLY	6005708
63	1	SENSOR ARM ASSEMBLY, SLSC — NOT SHOWN	6001543
64•	1	RP - 1/4 X 1.1/2, ZINC	6008645
65•	1	PW, TYPE A, 1" BOLT, 2"OD, ZINC	6008646
66•	1	ROLLER, SENSOR ARM, SLSC	6006230
67•	1	WELDMENT, SENSOR ARM, SLSC	6006229
68	2	CAP	6001730
69	1	SHSS - 1/2-13 UNC X 2.5	6001850
70	1	RP - 1/4 X 2	6008802
71	1	SLSC RAIL JUNCTION BOX	6001872
72	2	3/4-10 X 2-1/4" HEX BOLT	6001533
73	2	3/4-10 NYLOC NUT	214558
74	3	1-1/4 CAM FOLLOWER BEARING	6004095
75	3	NYLON LOCK NUT - 1/2-20 UNF	6004096
76	1	CAM FOLLOWER COVER	6010928
77	2	PW 5/16	234081
78	3	CSHSBH - 1/4-20 UNC X 1-1/4, ZP	6008574
79*	1	PIHHTS #12-0.75	215702
80	1	CAM ASSEMBLY — NOT SHOWN	6004848
81	1	CHOCK LOCK ASSEMBLY — NOT SHOWN	6004847
82	1	CHOCK ARM ASSEMBLY — NOT SHOWN	6004846
83	2	SCREW, FLBH, 1/4-20X 3/4	6008644
84	1	RAIL END ASSEMBLY	6001991
85	1	FRONT RAIL EXTENSION	4870008
86	1	REMOTE ROLLER GUARD STANDOFF (OPTIONAL)	6006667
87	1	REMOTE ROLLER GUARD (OPTIONAL)	6006666
88	3	KNOCKOUT PLUG	6001983
89	2	SPACER	6010783

*Included with item 81. **Included with item 82. †Included with item 80. ‡Included with item 62. §Included with item 30. •Included with item 63.

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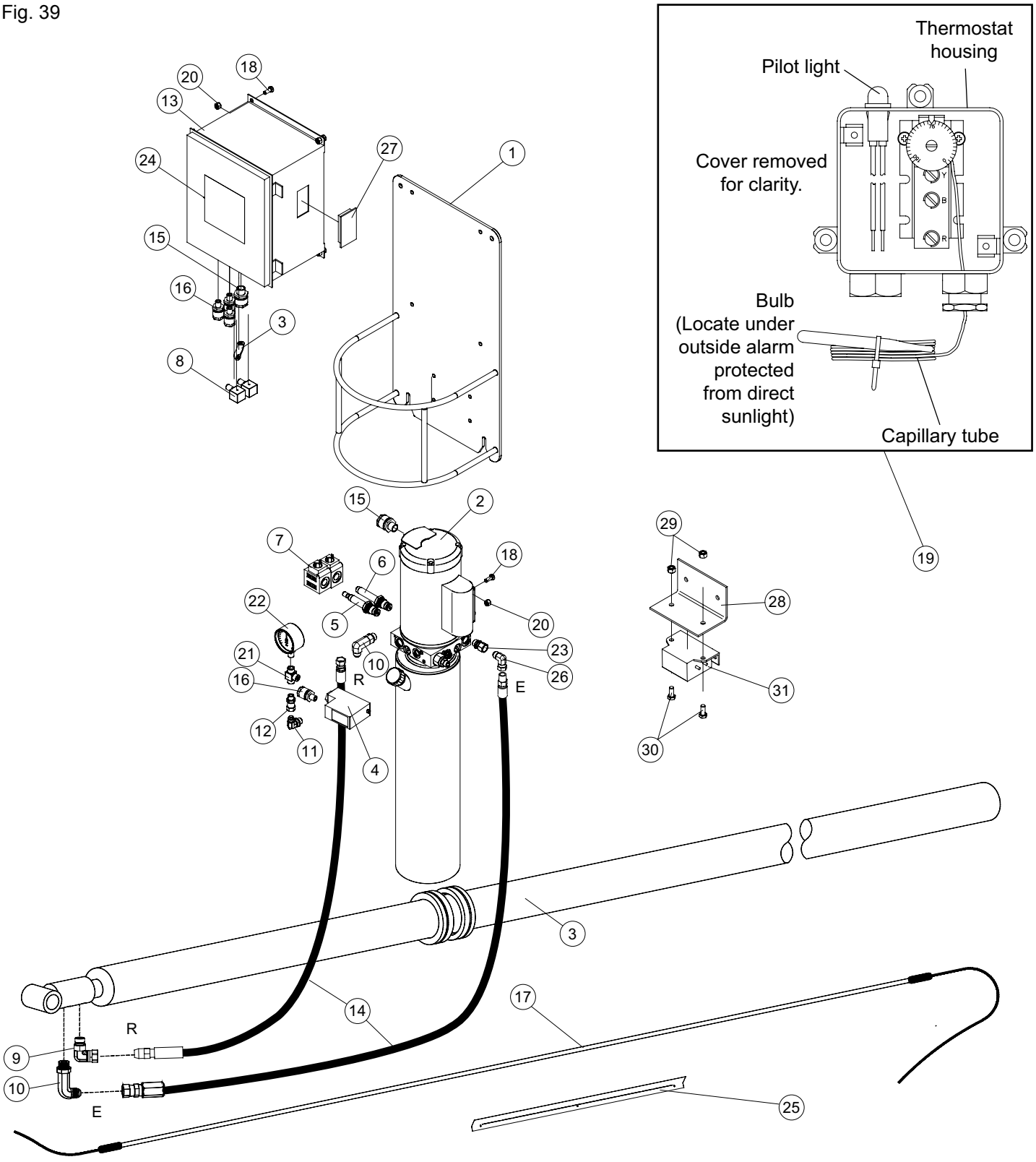
PARTS LIST — HYDRAULIC AND ELECTRICAL

Fig. 39



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PARTS LIST — HYDRAULIC AND ELECTRICAL, continued

Item	Quantity	Part Description	Part Number
1	1	MOTOR MOUNT ASSEMBLY	6011998
2	1	POWER UNIT - 120/1/50/60 POWER UNIT - 208/3/50 POWER UNIT - 240/1/50-60 POWER UNIT - 240/3/50-60 POWER UNIT - 480/3/50-60 POWER UNIT - 575/3/50-60	6011930 6011933 6011954 6011955 6011931 6011932
3	1	HYDRAULIC CYLINDER	313584
4	1	PRESSURE SWITCH - TELEMECANIQUE	6003045
5	1	SOLENOID VALVE - N/C WITH MANUAL RELIEF	6011709
6	1	SOLENOID VALVE - N/O	6011710
7	2	SOLENOID COIL - 125 V	6011946
8	2	HIRSCHMAN CONNECTOR	6001351
9	1	STRIAGHT THREAD TO SWIVEL	6013840
10	2	FITTING - LONG STRAIGHT THREAD ELBOW SAE #8	031447
11	1	FITTING - STRAIGHT THREAD ELBOW SAE #6	313106
12	1	FITTING - SWIVEL CONNECTOR SAE #6	313587
13	1	JUNCTION BOX, WITHOUT HEATER JUNCTION BOX, WITH HEATER (120V) JUNCTION BOX, WITH HEATER (208-600V)	6012068 6012019 6012069
14	2	HOSE AND FITTING ASSEMBLY	6013839
15	2	MOTOR CABLE GRIP	533424
16	4	LIMIT SWITCH CABLE GRIP	823-007
17	1	HEAT ELEMENT	623202
18	8	HHMB 5/16-18 X 3/4 LG. ZINC PLATED	212052
19	1	THERMOSTAT	061787
20	8	LN 5/16-18 UNC NYLOCK. ZINC PLATED	214522
21	1	1/4" TEE	6001867
22	1	HYDRAULIC PRESSURE GAUGE, 0-1500 PSI	6001715
23	1	FITTING, SWIVEL NUT ELBOW	6011446
24	1	SERCO® LABEL KELLEY® LABEL	921185 921186
25	4	HEATER COVER	4870074
26	1	FITTING, STRAIGHT SWIVEL	6013838
27*	1	GFI SWITCH — LEVITON	8590
28	1	ALARM BRACKET	6009307
29	2	NUT — ALARM BRACKET	214522
30	2	BOLT — ALARM BRACKET	214052
31	1	ALARM, CHOCK MOTION	061619

*Part of item 13, j-box with heater.

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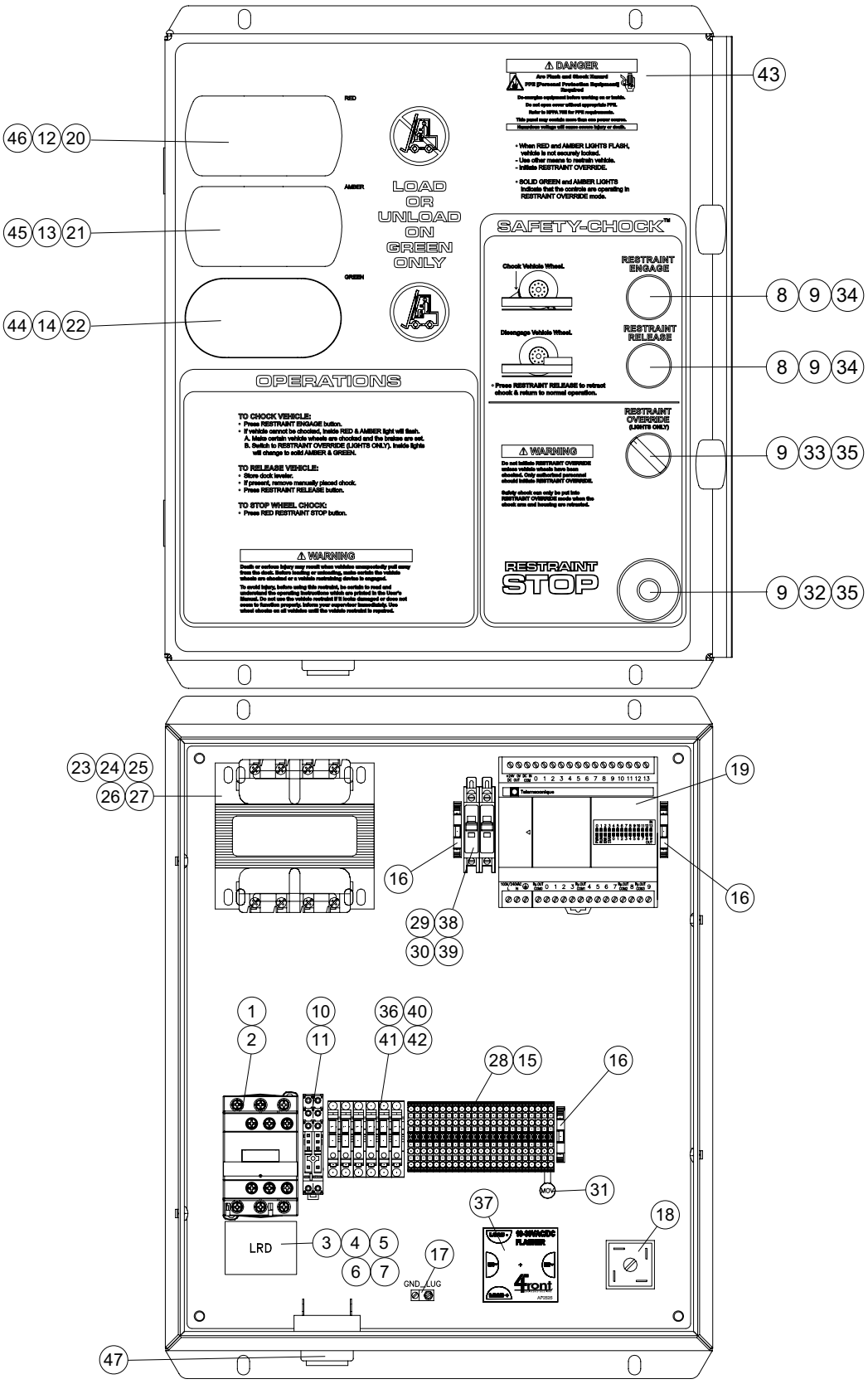
PARTS LIST — CONTROL PANEL

Fig. 40



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PARTS LIST — CONTROL PANEL, continued

	Serco®	6001710v1	6001710v2	6001710v3	6001710v4	6001710v5	6001710v6	6001710v7	6001710v8		
	Kelley®	6001801v1	6001801v2	6001801v3	6001801v4	6001801v5	6001801v6	6001801v7	6001801v8		
Item	Part Description	120 Single	208 Single	240 Single	208 Three	240 Three	380 Three	480 Three	575 Three	Part #	Tag ID
1	IEC contactor, NR, 120VAC, 0.5-7.5HP/9A		1	1	1	1	1	1	1	6000459	M1014
2	IEC contactor, NR, 120VAC,1-15HP/18A	1								6000469	M1014
3	Overload relay, 1.6-2.5 Amp						1	1	1	6000473	OL101
4	Overload relay, 4-6 Amp				1	1				6000475	OL101
5	Overload relay, 5.5-8 Amp			1						6000476	OL101
6	Overload relay, 9-13 Amp		1							6000477	OL101
7	Overload relay, 12-18 Amp	1								6000478	OL101
8	Pushbutton, mom, NEMA 4/4x/13	2	2	2	2	2	2	2	2	6000506	PB911 PB912
9	Body, mounting collar	4	4	4	4	4	4	4	4	6000515	PB911 PB912 PB918 SS905
10	Relay, 2 pole, form C, 24VAC	1	1	1	1	1	1	1	1	6000518	CR1009
11	Socket, relay	1	1	1	1	1	1	1	1	6000522	CR1009
12	Oval base (green lens)	1	1	1	1	1	1	1	1	823111	
13	Rectangle base (amber lens)	1	1	1	1	1	1	1	1	823107	
14	Rectangle base (red lens)	1	1	1	1	1	1	1	1	823107	
15	Fused disc terminal block, 1/4"x1-1/4"	5	5	5	5	5	5	5	5	6000538	FU1002 FU1005 FU1011 FU1018 FU902
16	End stop, screwless, 6mm	3	3	3	3	3	3	3	3	6000549	TB1
17	Bar, ground	1	1	1	1	1	1	1	1	6000559	BP
18	Rectifier, 25 Amp	1	1	1	1	1	1	1	1	6000562	DV1029
19	Twido PLC, 14" DC, 10out rly	1	1	1	1	1	1	1	1	6001056	PLC902
20	LRU, reg. curr., red, 10-28V AC/DC	2	2	2	2	2	2	2	2	6006375	LT1006
21	LRU, reg. curr., amber, 10-28V AC/DC	2	2	2	2	2	2	2	2	6006376	LT1007
22	LRU, reg. curr., green, 10-28V AC/DC	2	2	2	2	2	2	2	2	6006377	LT1008
23	Xfmr, 120/240V-24V, 50VA	1								632198	XF111
24	Xfmr, 240/480V to 120/24V, 200VA			1		1		1		6006815	XF311 XF511 XF711
25	Xfmr, 208/240/415V-120/24V, 250VA						1			E250TC	XF611
26	Xfmr, 208/240/480V-120/24V, 100VA		1		1					6007396	XF211 XF411
27	Xfmr, 600V-120/24V, 350VA								1	6006818	XF811

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PARTS LIST — CONTROL PANEL, continued

	Serco®	6001710v1	6001710v2	6001710v3	6001710v4	6001710v5	6001710v6	6001710v7	6001710v8		
	Kelley®	6001801v1	6001801v2	6001801v3	6001801v4	6001801v5	6001801v6	6001801v7	6001801v8		
Item	Part Description	120 Single	208 Single	240 Single	208 Three	240 Three	380 Three	480 Three	575 Three	Part #	Tag ID
28	Terminal, 4 pole	22	22	22	23	23	23	23	23	6006846	TB1
29	Block, fuse, 1 pole, fingersafe	1								6006849	FU109
30	Block, fuse, 2 pole, fingersafe		1	1	1	1	1	1	1	6006850	FU209 FU309 FU409 FU509 FU609 FU709 FU809
31	Suppressor	1	1	1	1	1	1	1	1	6006852	MOV
32	Pushbutton, mushroom, NEMA 4/4x/13	1	1	1	1	1	1	1	1	632215	PB918
33	Selector, 2pos, sprg rtn left, NEMA 4/4x/13	1	1	1	1	1	1	1	1	632219	SS905
34	Block, contact, N.O.	2	2	2	2	2	2	2	2	632228	PB911 PB912
35	Block, contact, N.C.	2	2	2	2	2	2	2	2	632229	PB918 SS905
36	Fuse	1	1	1	1	1	1	1	1	AGC-1/4	FU902
37	Flasher, 4 wire, 10-30VAC/VDC	1	1	1	1	1	1	1	1	AP2525	DV1025
38	Fuse, time delay	1	2		2			2		FNQ-R-1	FU109 FU209 FU409 FU709
39	Fuse, time delay			2		2	2		2	FNQ-R-2	FU309 FU509 FU609 FU809
40	Fuse	1	1	1	1	1	1	1	1	MDA-1	FU1011
41	Fuse	2	2	2	2	2	2	2	2	MDA-2	FU1002 FU1018
42	Fuse	1	1	1	1	1	1	1	1	MDA-3	FU1005
43	Panel face label — Serco Panel face label — Kelley	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	6002308 6002309	
44	Green lens, oval	1	1	1	1	1	1	1	1	AP0027	
45	Amber lens, rectangle	1	1	1	1	1	1	1	1	823102	
46	Red lens, rectangle	1	1	1	1	1	1	1	1	823100	
47	Alarm — TNF (optional)	1	1	1	1	1	1	1	1	6000580	

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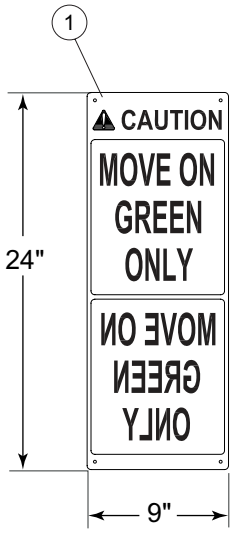
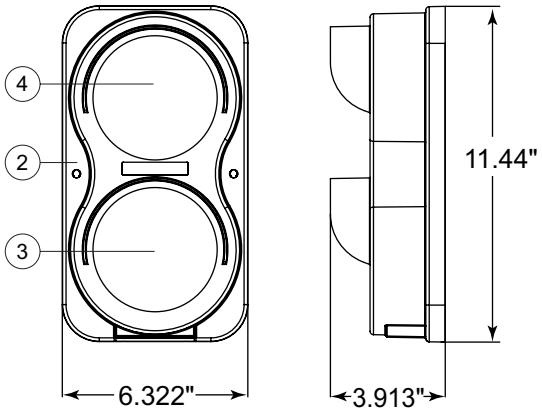
PARTS LIST — EXTERIOR SIGN AND LIGHTS

Fig. 41

Outside Sign



Standard 24V Compact Lights



Item	Quantity	Part Description	Part Number
1	1	Outside Sign	709832
2	1	24V Light Assembly - Complete (Compact Light, LED)	6007798
3*	1	Lens - Red LED Light Assy.	6007800
4*	1	Lens - Green LED Light Assy.	6007801

*Included with item 2.

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NOTES

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LIMITED WARRANTY

THIS LIMITED WARRANTY IS 4FRONT'S SOLE AND EXCLUSIVE WARRANTY WITH RESPECT TO THE WHEEL RESTRAINT AND IS IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED.

4Front warrants that this WHEEL RESTRAINT will be free from flaws in material and workmanship under normal use for a period of one (1) year from the earlier of 1) 60 days after the date of initial shipment by 4Front, or 2) the date of installation of the WHEEL RESTRAINT by the original purchaser, provided that the owner maintains and operates the WHEEL RESTRAINT in accordance with this User's Manual.

In the event that this WHEEL RESTRAINT proves deficient in material or workmanship within the applicable Limited Warranty period, owner shall so notify 4Front, and 4Front will, at its option:

1. Replace the WHEEL RESTRAINT, or the deficient portion(s) thereof, without charge to the owner; or

2. Alter or repair the WHEEL RESTRAINT, on site or elsewhere, without charge to the owner.

This Limited Warranty does not cover any failure caused by improper installation, abuse, improper operation, negligence, or failure to maintain and adjust the WHEEL RESTRAINT properly. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. 4FRONT DISCLAIMS ANY RESPONSIBILITY OR LIABILITY FOR ANY LOSS OR DAMAGE OF ANY KIND (INCLUDING WITHOUT LIMITATION, DIRECT, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR LOST PROFITS OR LOST PRODUCTION) arising out of or related to the use, installation or maintenance of the WHEEL RESTRAINT (including premature product wear, product failure, property damage or bodily injury resulting from use of unauthorized replacement parts or modification of the WHEEL RESTRAINT). 4Front's sole obligation with regard to a WHEEL RESTRAINT that is claimed to be deficient in material or workmanship shall be as set forth in this Limited Warranty. This Limited Warranty will be null and void if the original purchaser does not notify 4Front's warranty department within ninety (90) days after the product deficiency is discovered.

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Carrollton, TX. 75006
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